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Owner's Manual

For the

Cargo Hook
Suspension System Kits

On the

Agusta A109E, A119, AW119 MKII

Kit Part Numbers
200-355-00, 200-356-00, 200-357-00, 200-369-00

Owner's Manual Number 120-141-00
Revision 4
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Record of Revisions

Revision	*Date*	*Page(s)*	*Reason for Revision*
0	02/03/11	All	Initial Release
1	04/25/11	All	Revised washers for aft hard point installation to accommodate bolt grip length, clarified routing instructions for release lever hose and deleted one of the two attach points to cyclic shaft, changed screws for fwd connector bracket attachment and fairing attachment to a shorter screw (P/N 510-580-00).
2	11/18/13	2-23 thru 2-25	Updated pin load cell installation instructions.
3	12/16/13	2-4 thru 2-6	Revised instructions for installation of Support Brackets (P/N 291-363-00), added radius fillers (P/N 291-849-00), and changed bolt P/N 510-914-00 to 511-092-00.
4	08/24/15	1-6, 2-23, 2-25, 4-4, 4-5	Added pin load cell P/N 210-301-02. Updated load rigging section.

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CONTENTS

CONTENTS, continued

Section 1
General Information

Introduction

This Owner's Manual contains installation and operation instructions for cargo hook kit P/N's 200-355-00, 200-356-00, 200-357-00, and 200-369-00 on the Agusta A109E, A119, and AW119 MKII.

Kit P/N 200-355-00 (for the A109E) and P/N 200-369-00 (for the A119 and AW119 MKII) are fixed provisions kits which include the hard points to support the cargo hook suspension assembly, internal electrical release wire harness, manual release lever on the cyclic and associated hydraulic hose to a junction fitting on the belly of the helicopter, and miscellaneous brackets and hardware for supporting these items.

Kit P/N 200-356-00 is a cargo hook suspension kit which includes the cargo hook, a suspension frame assembly which supports the cargo hook and spans the hard points on the belly of the helicopter. It also includes the hydraulic hose and electrical release harness which connect the cargo hook to the fixed connectors on the belly of the helicopter.

Kit P/N 200-357-00 is a load weigh kit which includes a pin load cell, internal electrical harness, and cockpit mounted load weigh indicator. It requires that the helicopter be equipped with the P/N 200-356-00 Cargo Hook Suspension Kit.

These kits do not include a Rearview Mirror Assembly. It is recommended to obtain this assembly from Agusta (P/N 109-0710-91-3) to complete the installation.

Explanation of Signal Words and Symbols

The following definitions apply to the symbols used throughout this manual to draw the reader's attention to safety instructions as well as other important messages.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Draws the reader's attention to important or unusual information not directly related to safety.

Used to address practices not related to personal injury.

Specifications

Table 1.1 Kit Specifications

Suspension design load	3,086 lbs. (1,400 kgs.)
Suspension design ultimate strength	11,574 lbs. (5,250 kgs.)
Fixed Provisions Kit weight (P/N's 200-355-00 and 200-369-00)	8.5 lbs (3.9 kgs)
Cargo Hook Suspension Kit weight (kit P/N 200-356-00)	20.5 lbs (9.3 kgs)
Load Weigh Kit weight (kit P/N 200-357-00)	2.1 lbs (.95 kgs)

Table 1.2 Specifications - P/N 528-028-00 Cargo Hook

Design load	3,500 lbs. (1,587 kg.)
Design ultimate strength	13,125 lbs. (5,953 kg.)
Electrical release capacity	8,750 lbs. (3,969 kg.)
Mechanical release capacity	8,750 lbs. (3,969 kg.)
Force required for mechanical release at 3,500 lb.	12 lbs max. @ Master Cylinder
Electrical requirements	22-32 VDC 6.9 – 10 amps
Minimum release load	0 pounds
Unit weight	3.0 pounds (1.35 kg.)
Mating electrical connector	PC05A8-2S

Load capacities given are for the equipment described only. Loading limits for your particular helicopter model still apply. Consult your flight manual.

Bill of Materials

The following items are included with the 200-355-00 and 200-369-00 Fixed Provisions Kits.

Table 1.3 Bill of Materials – Fixed Provisions Kits P/N 200-355-00, 200-369-00

Part No.	Description	Qty 200-355-00	Qty 200-369-00
215-255-00	A109/A119 Information Decals	1	1
220-043-00	Fwd Connector Bracket Fairing	1	1
232-453-00	Fwd Hard Point Assembly	2	2
232-463-00	Fwd Connector Bracket Assembly	1	1
232-464-00	Intermediate Hose Assembly	1	1
232-465-00	Release Lever Assembly w/ Plumbing	1	1
232-466-00	Electrical Module Assembly	1	1
232-474-00	Barrel Nut Assembly	4	4
232-475-00	Aft Connector Bracket Assembly	1	1
235-177-00	Landing Gear Lock	1	-
270-178-00	Intermediate Electrical Harness	1	1
270-179-00	Internal Electrical Harness	1	1
270-180-00	Electrical Harness	1	1
291-361-00	Aft Hard Point	2	2
291-363-00	Support Bracket	2	2
291-365-00	Peel Shim	1	1
291-367-00	Peel Shim	1	1
291-617-00	Angle Bracket	1	1
291-849-00	Radius Filler	4	4
410-293-00	Bonding Jumper	1	1
410-296-00	Ring Terminal	2	2
410-312-00	Contact, Size 20	2	2
440-010-00	Circuit Breaker	1	1
510-029-00	Nut	12	12
510-042-00	Washer	4	4
510-062-00	Washer	12	12
510-102-00	Nut	3	4
510-112-00	Nut	2	2
510-115-00	Cotter Pin	6	6
510-290-00	Bolt	4	4
510-391-00	Screw	5	5
510-419-00	Washer	42	42
510-453-00	Bolt	3	4
510-481-00	Screw	4	4
510-580-00	Screw	8	8
510-644-00	Screw	16	16
510-645-00	Screw	7	6
510-647-00	Spacer	7	6
510-657-00	Washer	2	-
510-672-00	Screw	8	8
510-737-00	Washer	12	12
510-909-00	Bolt	4	4

Bill of Materials continued

Table 1.3 Bill of Materials – Fixed Provisions Kit P/N 200-355-00, 200-369-00 continued

Part No.	Description	Qty 200-355-00	Qty 200-369-00
510-911-00	Bolt	2	2
510-915-00	Nut	4	4
510-918-00	Bolt	2	2
510-946-00	Screw	2	-
510-972-00	Rivet	2	2
510-986-00	Washer	4	4
511-092-00	Bolt	4	4
512-003-00	Ty-wrap	14	14
512-005-00	Adel Clamp	9	9
512-021-00	Adel Clamp	1	1
512-028-00	90 Deg. Angle Bracket	1	1
512-034-00	Adel Clamp	-	1
120-141-00	Owner's Manual	1	1
121-055-00	RFMS	1	1
123-036-00	ICA	1	1

The following items are included with the 200-356-00 Cargo Hook Suspension Kit.

Table 1.4 Bill of Materials – Cargo Hook Suspension Kit P/N 200-356-00

Part No.	Description	Qty
210-244-00	Suspension Frame With Hook	1
215-256-00	External Load Limit 3086 Decal	1
215-258-00	External Load Limit 2205 Decal	1
120-141-00	Owner's Manual	1
122-015-00	Service Manual	1
123-036-00	ICA	1
121-055-00	RFMS	1

Bill of Materials continued

The following items are included with the P/N 200-357-00 Load Weigh Kit.

Table 1.5 Bill of Materials – Load Weigh Kit P/N 200-357-00

Part No.	Description	Qty
210-095-02	C-39 Indicator Assembly	1
210-301-02*	Pin Load Cell Assembly	1
232-451-00	Bracket Assembly	1
232-452-00	Mounting Plate Assembly	1
235-198-00	Outer Cover	1
270-177-00	Load Weigh Internal Harness	1
270-182-00	Jumper Assembly	1
410-199-00	Shield Termination	1
410-312-00	Contact, 20 ga.	3
510-178-00	Cotter Pin	1
510-493-00	Screw	4
510-637-00	Screw	4
510-639-00	Instrument Mounting Nut	4
510-640-00	Screw	5
510-657-00	Washer	4
512-003-00	Ty-wrap	10
512-006-00	Adel Clamp	2

*Supersedes 210-226-02, these P/Ns are interchangeable.

Bill of Materials continued

To complete the cargo hook installation the following parts may be necessary to obtain (these parts are frequently found to be on the aircraft from the factory or are standard Agusta parts) from Agusta or Onboard Systems. Refer to Table 1.5 for structural parts that can be obtained from Agusta or Onboard Systems if they are not present

These kits do not include a Rearview Mirror Assembly. It is recommended to obtain this assembly from Agusta (P/N 109-0710-91-3) to complete the installation.

NOTICE

These items may or may not be installed with a standard aircraft, therefore verification is recommended before purchasing them. Refer to Section 2.1 for identification of Doublers.

Table 1.6 Additional Structural Parts Required

Agusta P/N	Equivalent Onboard Systems P/N	Description	Qty
109-0854-51-133	235-174-00	Bulkhead Fitting Doubler	2
109-0882-23-109	235-175-00	Fwd Hard Point Doubler	2
109-0882-23-107	235-176-00	Fwd Hard Point Internal Doubler	2
109-0882-23-115	235-180-00	Aft Hard Point Doubler	2
109-0882-23-113	291-362-00	Aft Hard Point Shim	1
N/A	510-912-00	Rivet	8
N/A	510-913-00	Rivet	8

Table 1.7 Additional Electrical Parts Required

Agusta P/N	Description	Qty
83-453-015	Pushbutton Electrical Switch (cyclic)	1
999-8001-74-211	Bus Bar	1

Theory of Operation

The cargo hook system is comprised of:

- The cargo hook and suspension assembly. The suspension assembly spans the aircraft hard points and supports the cargo hook.
- The electrical release system. The electrical release system provides means for release by pilot actuation of the push-button switch on the cyclic. When the push-button switch is pressed, it energizes the solenoid in the cargo hook, and the solenoid opens the latch in the internal mechanism, which allows the load to fall free.
- The manual release system. The manual release system provides a means of releasing a cargo hook load in the event of an electrical release system failure. The manual release system included with this kit utilizes hydraulics. A lever/master cylinder assembly mounted to the cyclic, when actuated, moves a piston through the master cylinder, which transmits this motion via the hydraulic line to a slave cylinder piston on the cargo hook. The slave cylinder piston extends and actuates the internal mechanism of the cargo hook and allows the load to fall free.
- Ground personnel may also release a load by the actuation of a lever located on the side of the cargo hook.

A load is attached to the cargo hook by passing a cargo sling ring into the throat of the load beam and pushing the ring against the upper portion of the load beam throat, which will cause the hook to close. In the closed position, a latch engages the load beam and latches it in this position.

To release the load, the latch is disengaged from the load beam. With the latch disengaged, the weight of the load causes the load beam to sling to its open position, and the cargo sling ring slides off the load beam. The load beam then remains in the open position awaiting the next load.

The 200-357-00 kit is a load weigh system, which includes an indicator mounted within the instrument panel, a pin load cell at the cargo hook, and the interconnecting wire harness. The indicator displays the weight of the load carried on the cargo hook. It supplies the precision excitation voltage to the pin load cell, conditions the return signal, outputs a proportional analog signal and provides the means of system calibration.

Section 2
Installation Instructions

These procedures are provided for the benefit of experienced aircraft maintenance facilities capable of carrying out the procedures. Those lacking the necessary expertise should not attempt them.

This Owner's Manual provides instructions for the installation of the four kits outlined in Section 1. The installation instructions for each kit are provided in the following sections.

2.1 Fixed Provisions Kit P/N 200-355-00, 200-369-00
2.2 Cargo Hook Suspension Kit P/N 200-356-00
2.3 Load Weigh Kit P/N 200-357-00

2.1 Fixed Provisions Kit Installation (Kit P/Ns 200-355-00, 200-369-00)

This part of the installation consists of installing the hard points and their supporting brackets and doublers, internal cargo hook electrical release wiring, fixed hydraulic release system, and electrical support brackets.

2.1.1 Hard Point Installation

The hard points are fastened to the belly of the helicopter and provide the attachment points for the cargo hook suspension frame.

The two aft hard points (P/N 291-361-00) are installed at STA 4010.0 and LBL and RBL 205.0.

Each aft hard point requires that a Doubler (P/N 235-180-00) be installed between it and the lower belly panel of the helicopter.

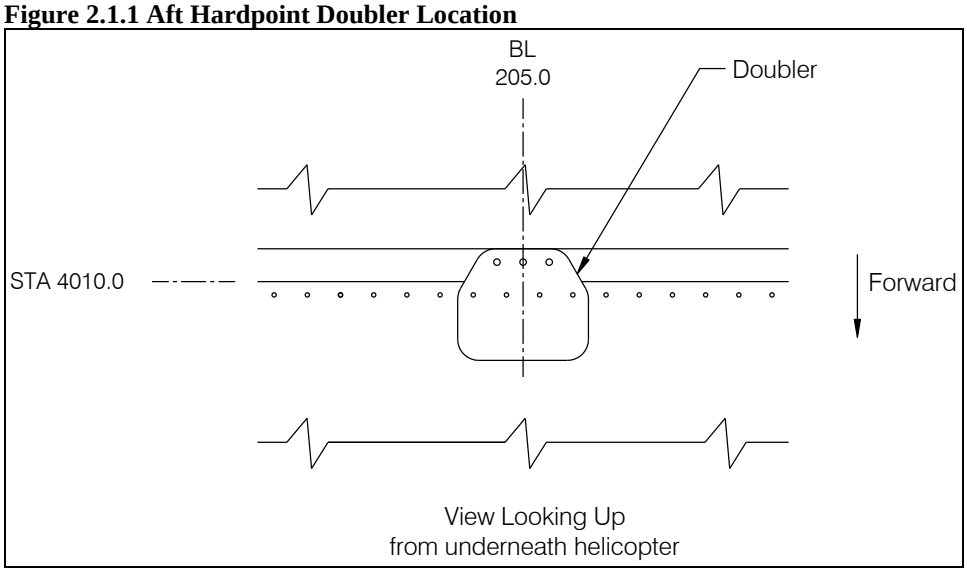
These doublers are normally found to be installed by the OEM at the factory. If they are not, obtain them and Peel Shims (P/N 291-362-00) from Onboard Systems and install them per the following instructions.

2.1 Fixed Provisions Kit Installation continued

2.1.1 Hard Point Installation continued

- Layout the Doubler (P/N 235-180-00) locations and remove the four (4) rivets from the row of existing rivets in the lower panel that interfere with these locations.

Figure 2.1.1 Aft Hardpoint Doubler Location



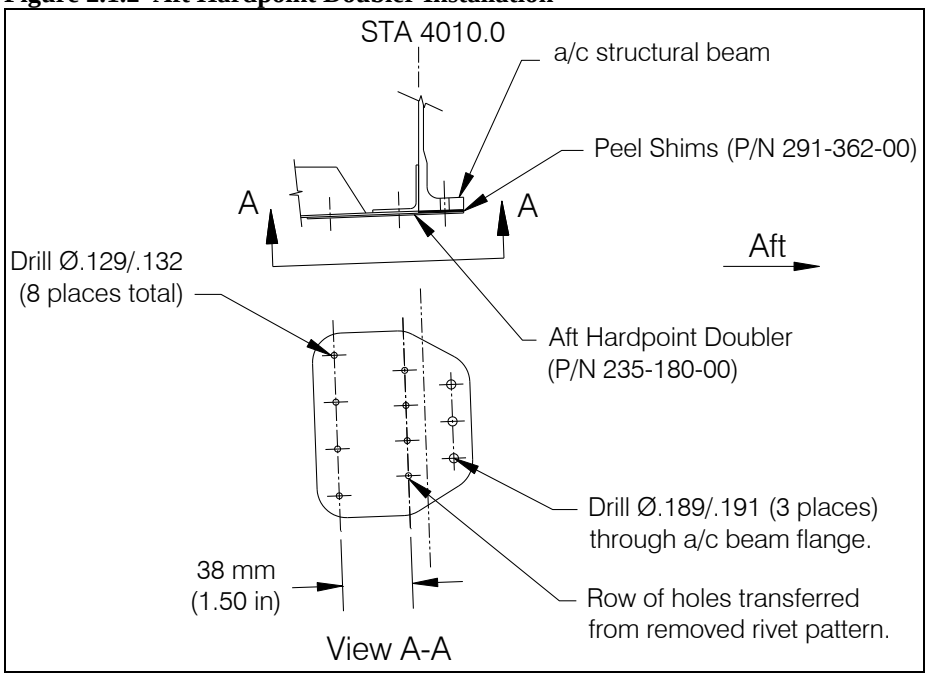
- Transfer the hole pattern of the four (4) removed rivets to the Doubler and drill four holes .129/.132 in. (3.28/3.35mm) in diameter at these locations.
- Drill a row of four holes .129/.132 in. (3.28/3.35mm) in diameter 1.50 in. (38 mm) forward of the row drilled in the previous step (refer to Figure 2.1.2), maintaining proper spacing (minimum of 4D between rivets and 2D edge margin).
- Drill Ø.189/.191 (4.80/4.85 mm) through the aft flange of the aircraft structural beam to match the aft three holes in the Doubler and four Ø.129/.132 in. (3.25/3.35 mm) holes in the belly panel to match the forward four holes in the Doubler.
- Clean the areas of the lower panel which will mate with the doublers.

2.1 Fixed Provisions Kit Installation continued

2.1.1 Hard Point Installation continued

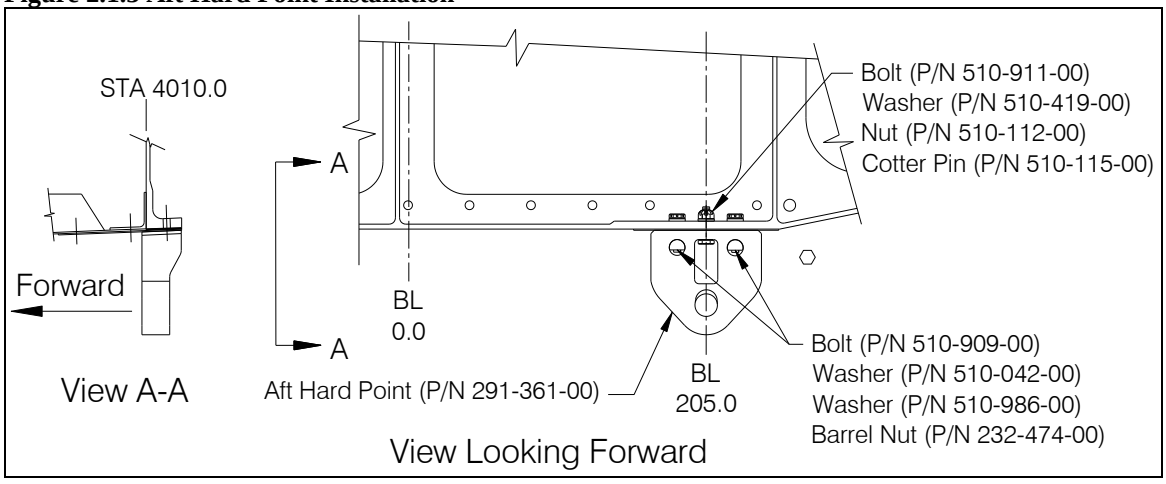
- Install peel shims (P/N 291-362-00) as necessary to fill the gap between the Doublers and the a/c structural beam flange.
- Apply Hysol EA934NA adhesive to the shims and Doublers, align their hole patterns, and secure to the aircraft structural beam with rivet P/N 510-913-00 at the forward row of four holes and rivet P/N 510-912-00 at the aft row of four holes.

Figure 2.1.2 Aft Hardpoint Doubler Installation



- Attach each Aft Hard Point (note orientation in View A-A of Figure 2.1.3) with hardware as shown in Figure 2.1.3.

Figure 2.1.3 Aft Hard Point Installation



2.1 Fixed Provisions Kit Installation continued

2.1.1 Hard Point Installation continued

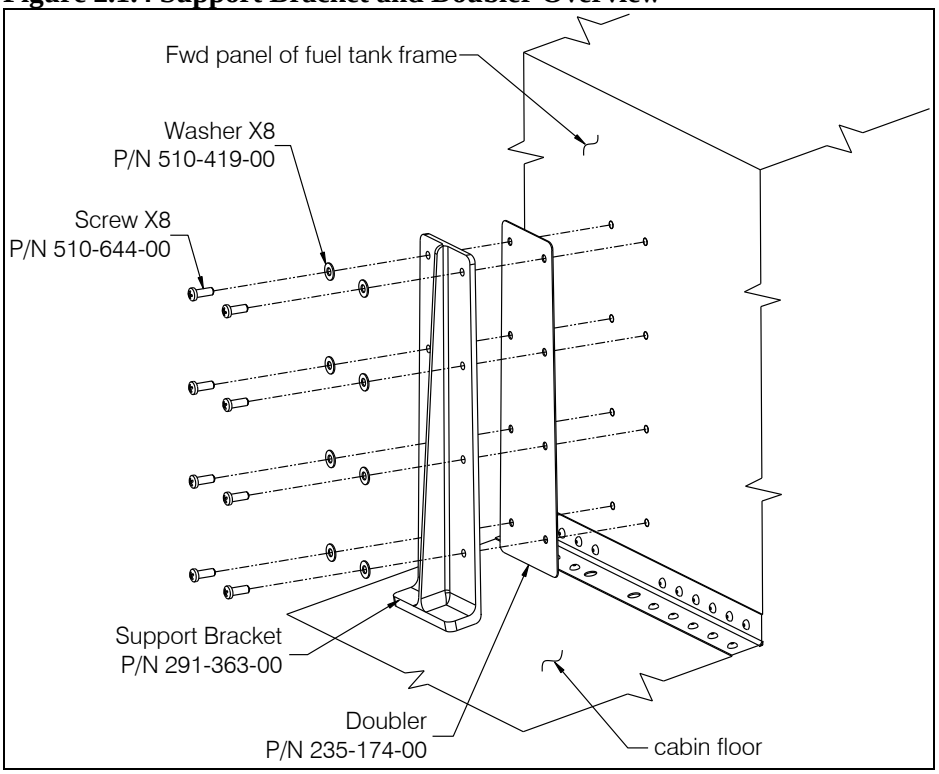
The two forward hard points (P/N 232-453-00) and their Support Brackets (P/N 291-363-00) are installed at STA 3067.0 and LBL and RBL 205.0.

NOTICE

The Doublers (Onboard Systems P/Ns 235-174-00, 235-175-00, and 235-176-00) for the forward hard points are typically installed at the factory by the OEM. If they are not installed, obtain and install them per the following instructions (also refer to Agusta Service Instruction A119 SI-002).

- If Doublers on the forward panel of the fuel tank frame are not already installed, clean and prep the mating surfaces as necessary and bond the Doublers (P/N 235-174-00) in position using EA934NA adhesive, aligning the holes with the inserts in the panel.
- Position the Support Brackets over the Doublers and temporarily secure with enough of the screws (P/N 510-644-00) and washers (P/N 510-419-00) provided to hold them securely in position for marking the bottom flanges for drilling.

Figure 2.1.4 Support Bracket and Doubler Overview



2.1 Fixed Provisions Kit Installation continued

2.1.1 Hard Point Installation continued

- Transfer the location of the aft pair holes at each forward hard point position to the lower flange of the Support Brackets and match drill Ø.257/.290 (6.5/7.4 mm) holes in position or remove the Support Brackets and use a drill press.
- Center a Radius Filler about each hole in the lower flange of the Support Bracket (reference Figure 2.1.6) and transfer each hole location in the Support Brackets to a Radius Filler (P/N 291-849-00) and drill Ø.257/.290 (6.5/7.4 mm) through.
- Re-install (if removed) and complete the installation of the two Support Brackets per Figure 2.1.4.
- As necessary, fill the gap between the bottom of the Support Brackets and the adjacent structure with Peel Shims (P/N 291-365-00).

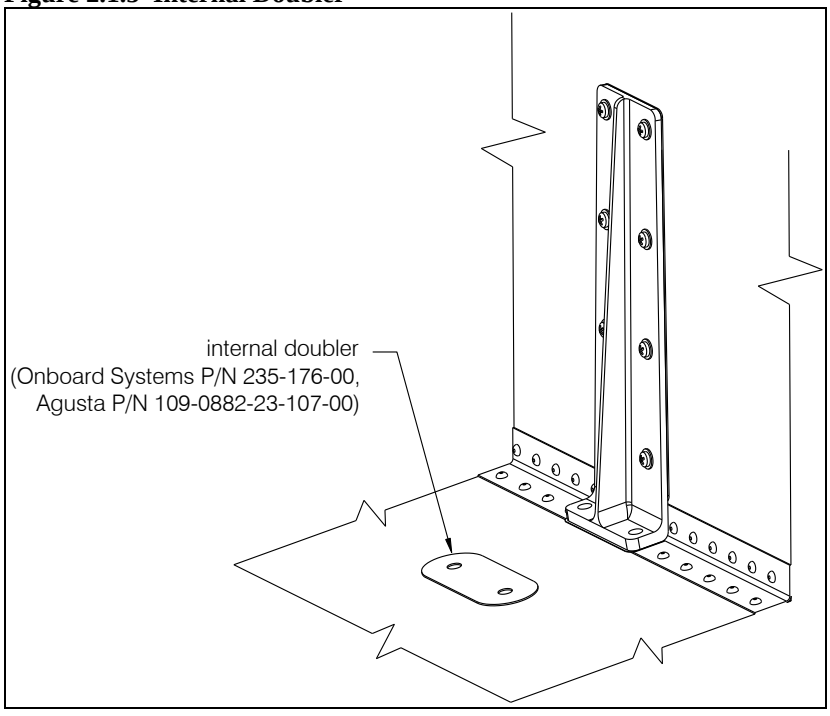
The forward pair of fasteners for the forward hard points are attached to inserts in the bottom panel which are reinforced at each location with an internal Doubler (see below).

- If the inserts and doubler are not installed at each location, install inserts (Agusta P/N K100H4A95-17, not supplied) and Doubler (not supplied) per Agusta instructions (A119 SI-002).

NOTICE

Doubler P/N 235-176-00 is interchangeable with Agusta Doubler P/N 109-0882-23-107.

Figure 2.1.5 Internal Doubler

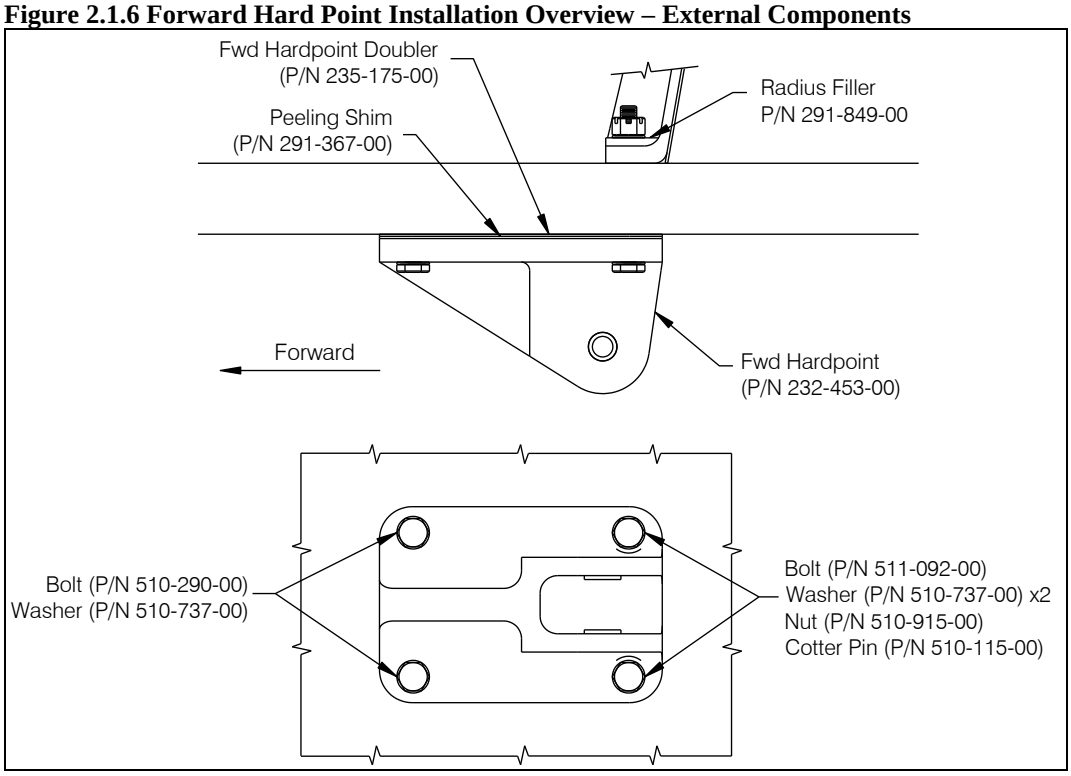


2.1 Fixed Provisions Kit Installation continued

2.1.1 Hard Point Installation continued

Working external to the aircraft's lower belly panel, prep the mating surfaces and bond the P/N 235-175-00 Doublers (if Doublers (Agusta P/N 109-0882-23-109) are not already installed) to the external surface of the lower panel, aligning its four holes with those in the belly panel.

Figure 2.1.6 Forward Hard Point Installation Overview – External Components



Peel Shims (P/N 291-367-00) are provided for the forward hard points. To determine the amount of shimming, if any, perform the following.

- Temporarily install each Fwd Hard Point Assembly to the aircraft using two bolts (P/N 511-092-00), four radius fillers (P/N 291-849-00) four washers (P/N 510-737-00), and two nuts (P/N 510-915-00) at the aft pair of holes and two bolts (P/N 510-290-00) and washers (P/N 510-737-00) at the forward pair of holes.
- Install the Cargo Hook/Frame Assembly by inserting the aft pins through the aft hard points and rotating the front up. Check for alignment by attempting to pin the forward attach points through the forward hard points. If the pins cannot be inserted, shim forward hard points as necessary using the peeling shims.
- Upon completion of shimming (if necessary) re-install the Fwd Hard Point Assembly hardware as needed. Depending on amount of shimming, additional washers may be necessary under the nuts to align cotter pin holes.
- Tighten aft pair of bolts at each hard point to 50-70 in-lbs (5.6-7.9 Nm) and secure the nuts with cotter pins (P/N 510-115-00). Tighten forward pair of bolts to 25-35 in-lbs (2.8-3.9 Nm).

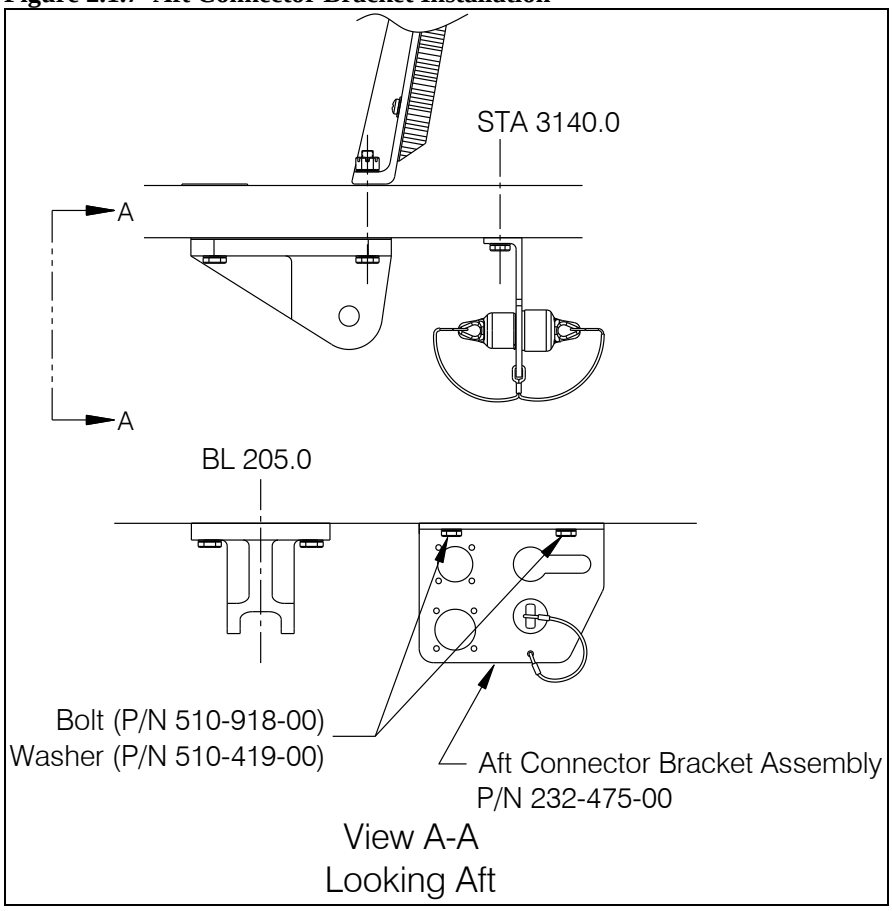
2.1 Fixed Provisions Kit Installation continued

2.1.2 Support Brackets Installation

The support brackets installation includes the installation of an aft connector bracket near the forward hard point location and a forward connector bracket and fairing underneath the center console.

The aft connector bracket (P/N 232-475-00) is installed to the left and just aft of the left forward hard point (at STA 3140) using existing inserts in the lower belly panel.

Figure 2.1.7 Aft Connector Bracket Installation



2.1 Fixed Provisions Kit Installation continued

2.1.2 Support Brackets Installation continued

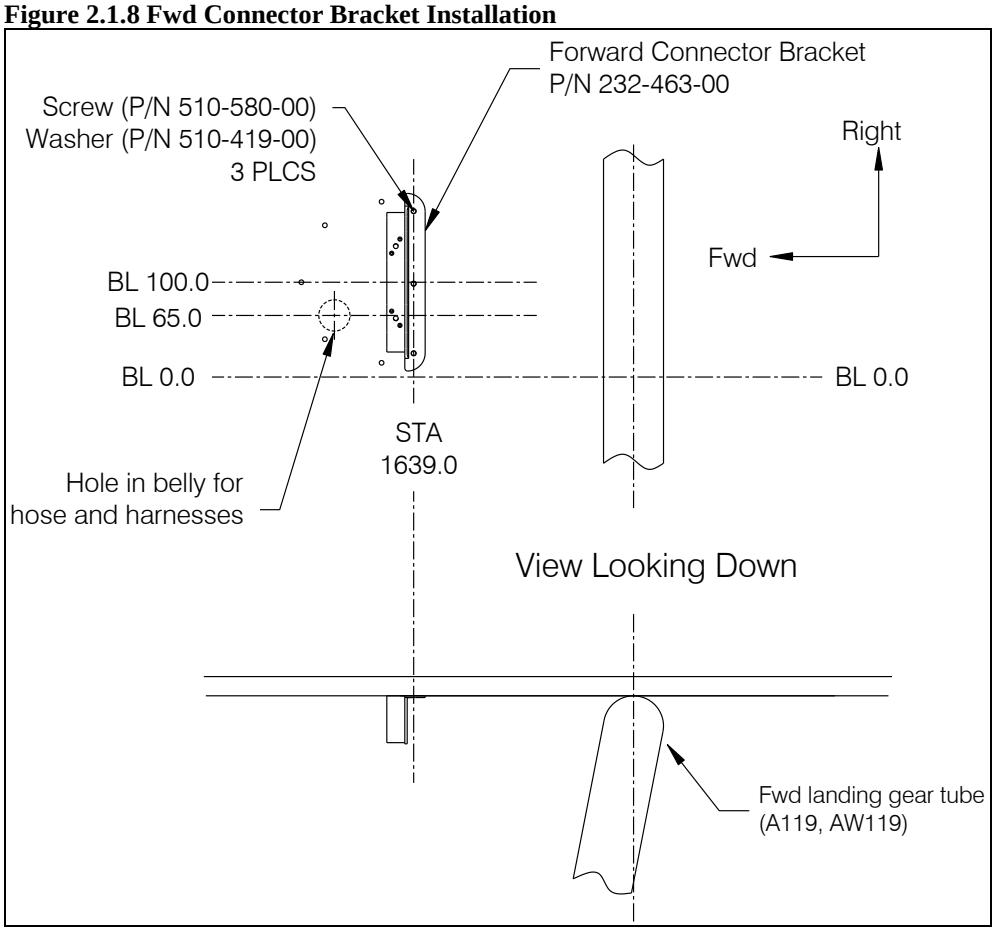
The forward connector bracket (P/N 232-463-00) is installed on the belly of the helicopter below the center console between the pilot and co-pilot seats.

Position the bracket as shown and secure with three screws and washers as shown in Figure 2.1.8.

NOTICE

Inserts in the belly are normally installed at this location for the Agusta connector bracket which has the same hole pattern as bracket P/N 232-463-00. If these inserts and the through hole are not present, install them and create the through hole in the belly per Agusta cargo hook installation drawing (109-0854-51) or Service Instruction A119 SI-002 as applicable.

Figure 2.1.8 Fwd Connector Bracket Installation



2.1 Fixed Provisions Kit Installation continued

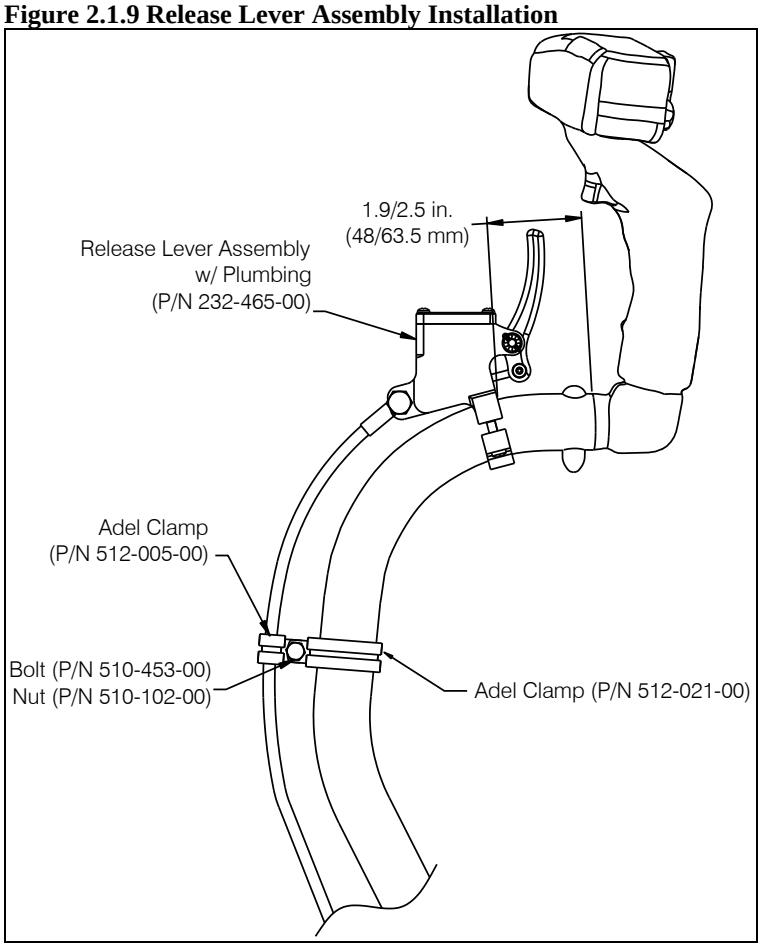
2.1.3 Fixed Hydraulic Release System Installation

The hydraulic release system is supplied dry. It is recommended that the system be filled and bled on the bench before installing it on the helicopter. Refer to section 2.4 for filling and bleeding instructions.

The fixed hydraulic release system consists of the release lever/master cylinder assembly which is mounted on the cyclic and hose which is routed from the master cylinder to underneath the pilot seat and then towards the center of the aircraft where it is routed through the hole in the belly to the forward connector bracket installed previously.

- Remove seats and center console cover to access areas of routing.
- Mount the Release Lever Assembly (P/N 232-465-00) to the cyclic as shown below with the two screws provided pre-assembled onto the assembly. Adjust the location if necessary so that the lever is accessible and comfortably reached by hand from the cyclic grip but not be able to contact or interfere with operation of any cyclic grip control when it is actuated. Operation will be verified at installation check out (when the release system is operational).
- Route the hydraulic hose along the cyclic and secure it using the adel clamps and hardware as shown in Figure 2.1.9.

Figure 2.1.9 Release Lever Assembly Installation

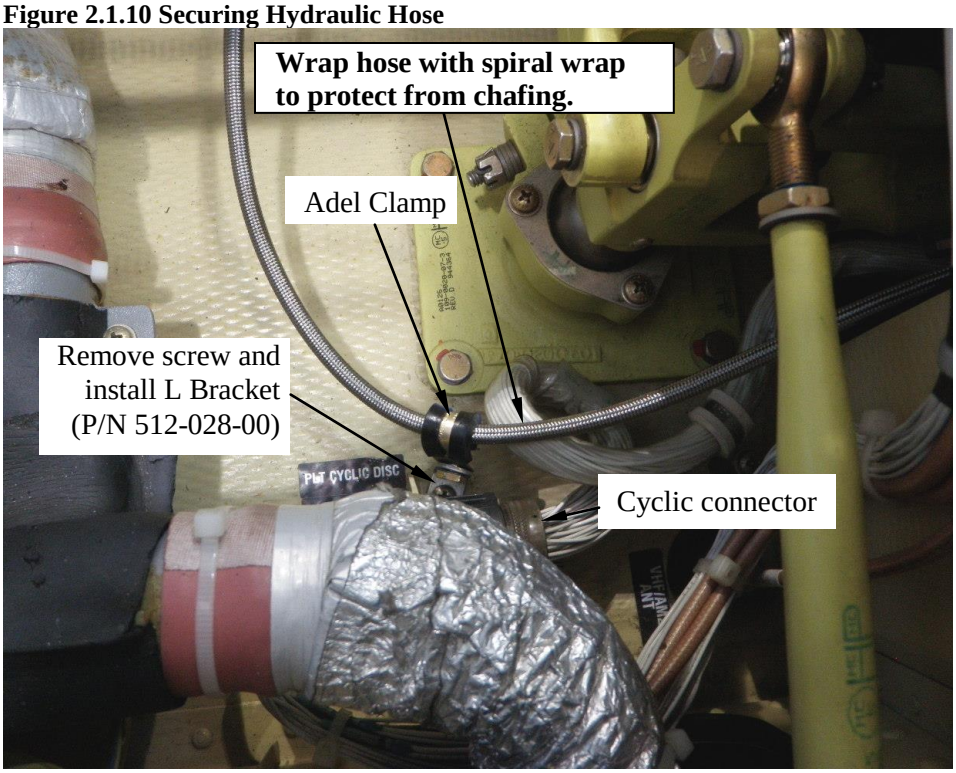


- At the base of the cyclic, route the quick disconnect end through the lower right corner of the boot and into the bay underneath the seat.
- Remove the inboard screw at the cyclic connector bracket and install an L Bracket (P/N 512-028-00). Secure the hose to this L bracket with an adel clamp (P/N 512-005-00) using the supplied screw (P/N 510-453-00), washer (P/N 510-419-00), and nut (P/N 510-102-00).

⚠ CAUTION

Move cyclic throughout its range of motion to ensure that the hose is secured clear of flight control linkage. Ensure hose is clear of any potential chafing points. Wrap hose with spiral wrap to protect from rubbing on wiring.

Figure 2.1.10 Securing Hydraulic Hose



- Route the hose towards the center of the aircraft and into the bay underneath the center console.

2.1 Fixed Provisions Kit Installation continued

2.1.3 Fixed Hydraulic Release System Installation continued

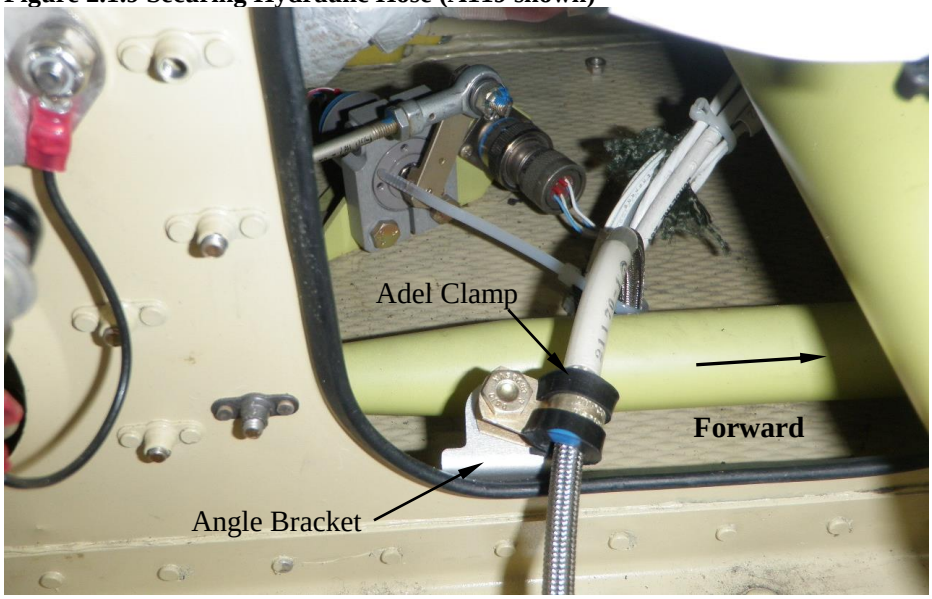
- Temporarily install the adel clamp (P/N 512-005-00) over the hose and loosely secure to the Angle Bracket (P/N 291-617-00) with bolt (P/N 510-453-00), washer (P/N 510-419-00) and nut P/N (P/N 510-102-00). Position the Angle Bracket in a best fit location on the aircraft structure between the two bays (see Figure 2.1.9) such that the hose will route through the hose in the belly and clear at least 1" (25 mm) around the foot pedal control tube when moved throughout its range of motion.
- Before installing the Angle Bracket, route the hose to the hole in the belly to mate up with the forward connector bracket (P/N 232-463-00) installed previously and ensure it reaches the designated mounting hole.

⚠ CAUTION

Ensure that the hose is secured clear of flight control linkage and any potential chafing points and is wrapped to protect from chafing.

- After verifying satisfactory routing per the previous two steps, drill two .098 in. (2.50 mm) holes to match the hole pattern in Angle Bracket (P/N 291-617-00) and attach Angle Bracket using two rivets (P/N 510-972-00).
- Fully tighten the adel clamp onto the Angle Bracket.

Figure 2.1.9 Securing Hydraulic Hose (A119 shown)



- Remove the nut from the end of the hose fitting and insert the fitting through the 5/16" hole in the bracket and re-install the nut over it to secure it to the bracket.

2.1 Fixed Provisions Kit Installation continued

2.1.3 Fixed Hydraulic Release System Installation continued

The Intermediate Plumbing Assembly is routed between the forward connector bracket and the aft connector bracket and supported along the belly using existing inserts.

- Connect the appropriate end of the plumbing assembly to the fitting at the forward connector bracket installed previously.
- At existing belly panel inserts at STA 1832.0, 2019.0, 2207.0, 2394.0, 2582.0, 2769.0 and 2956.0 (refer to Figure 2.1.10) secure the hydraulic hose with spacer (P/N 510-647-00), adel clamp (P/N 512-005-00), screw (P/N 510-645-00), and washer (P/N 510-419-00).

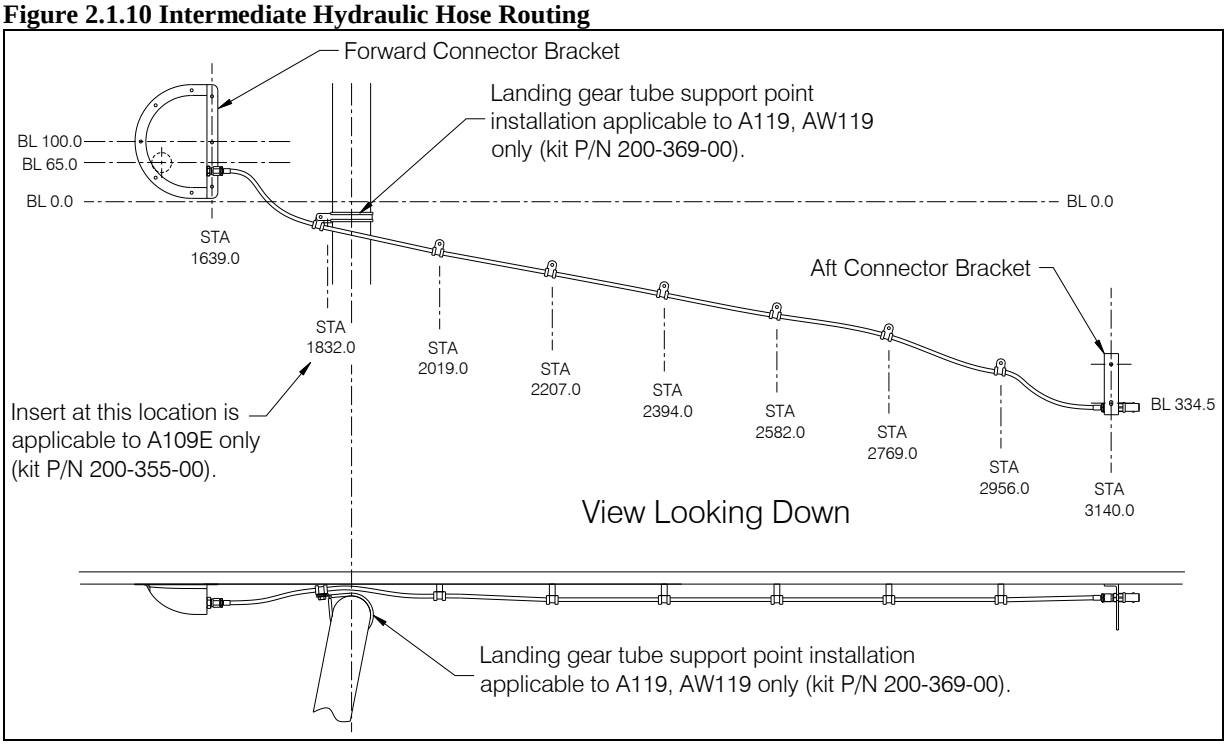
For kit P/N 200-369-00 for the A119 and AW119 MKII:

NOTICE

On the A119 models the forward skid gear tube will need to be lowered from the belly in order for the electrical harness P/N 270-178-00 connector(s) to be routed through. See section 2.1.4.

- Place adel clamp P/N 512-034-00 over the forward cross tube and attach adel clamp P/N 512-005-00 with hydraulic hose routed through it with screw P/N 510-453-00, washer P/N 510-419-00, and nut P/N 510-102-00.

Figure 2.1.10 Intermediate Hydraulic Hose Routing



- At the aft connector bracket (installed previously) insert the hose assembly's quick release fitting through the keyhole and slide it to the end of the slot and tighten the nut to secure it into place.

2.1 Fixed Provisions Kit Installation continued

2.1.4 Electrical Release Wiring Installation

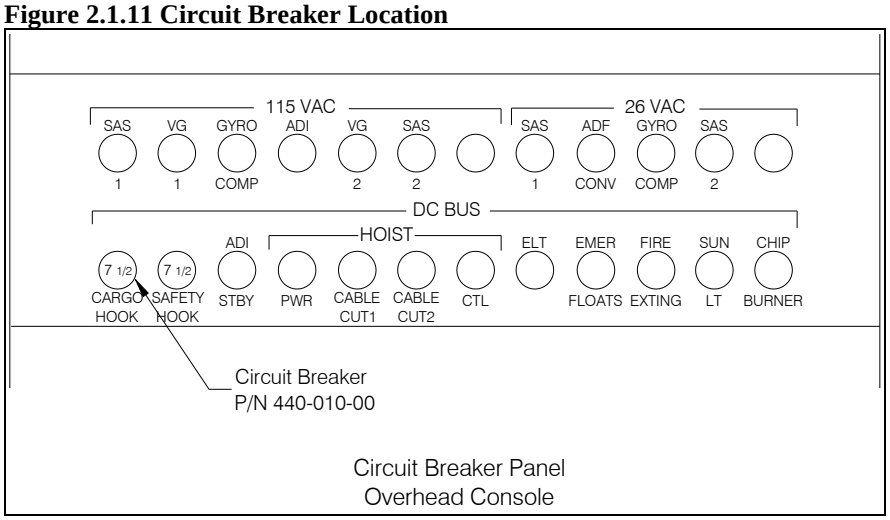
Remove circuit breaker panel and other panels as necessary to route wires from the circuit breakers to underneath the pilot and co-pilot seats. Remove pilot and co-pilot seats and the access panels below and in-between the seats.

NOTICE

If the optional load weigh kit (Kit P/N 200-357-00) is being installed, route its wiring harness through the structure as the release wiring harness is installed. Refer to section 2.3.3 for load weigh harness installation instructions.

- Install the circuit breaker (P/N 440-010-00) in the overhead console (reference Figure 2.1.11).

Figure 2.1.11 Circuit Breaker Location



- Connect the ring terminals on the M364A20 and M362A16 wires of harness P/N 270-180-00 to the circuit breaker with hardware provided with the circuit breaker.
- Route the M364A20 and M362A16 wires with existing harnesses from the circuit breaker down to the bay underneath the pilot's seat.
- Observe the following precautions while routing all wires.
  - Pick up existing wire runs by opening existing cable clamps. Nylon ties alone may not be used for primary support.
  - The distance between supports should not exceed 21 inches.
  - Bend radius of wire or harness must not be less than 10 times the wire or harness diameter.
  - Inspect and verify that the wire harness may not be manually deflected into a structure with a bend radius of less than .13".

2.1 Fixed Provisions Kit Installation continued

2.1.4 Electrical Release Wiring Installation continued

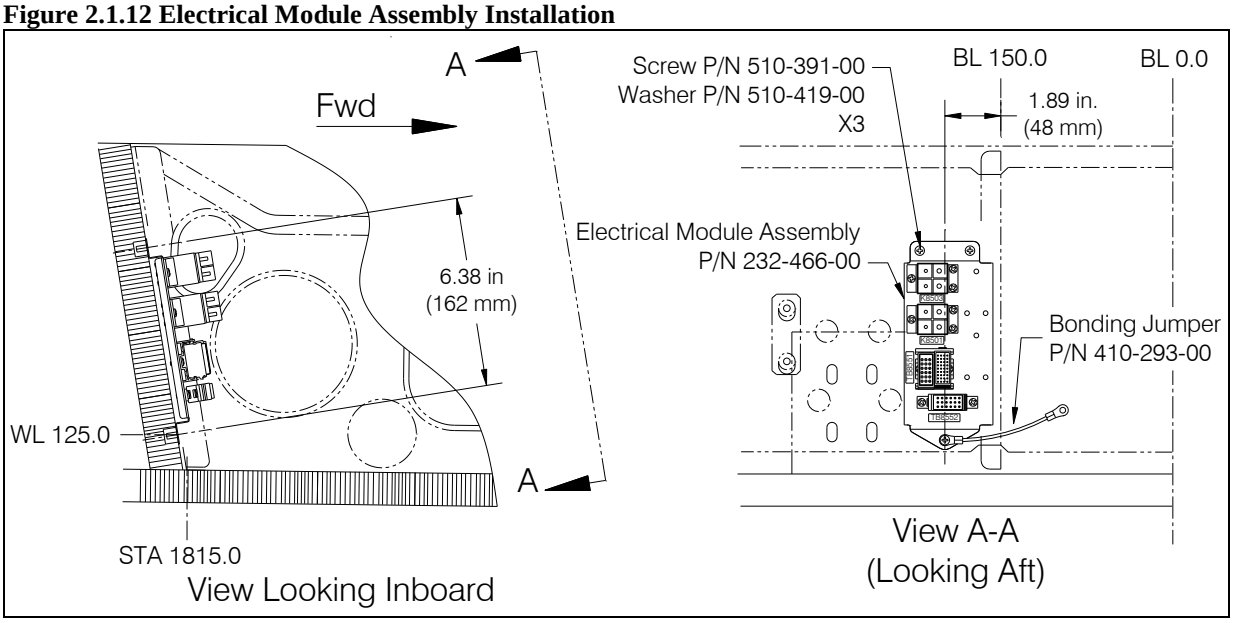
- Before installing the Electrical Module Assembly (P/N 232-466-00) an additional jumper and/or diode (supplied with the assembly) must be added to it for the "Hook Armed" illumination light depending on the model helicopter into which it is being installed. Refer also to electrical schematics, Figure 2.1.14 and Figure 2.1.15.
  - For the A109E model and A119 and AW119 MkII models without IDS: Install supplied wire M393A22 into module 2, pin a and connect diode (P/N 340-037-00) from module 2, pin M to module 2, pin d insulating the leads with the supplied heat shrink (P/N 450-001-00) or similar. Refer to electrical schematic.
  - For the A119 and AW119 MkII models with IDS: Install supplied wire M408A22 into module 2, pin M. Do not install diode.
- Install the Electrical Module Assembly in the bay underneath the pilot's seat with three screws (P/N 510-391-00) and washers (P/N 510-419-00). Attach one end of the bonding jumper (P/N 410-293-00) at one of the three mounting points depending on availability of a ground point.

NOTICE

If the inserts are not installed within the panel, layout and install 3 inserts (P/N SL10429-3-4S) per Agusta standard practices.

- Ground other end of Bonding Jumper at an existing ground point using existing hardware or pick up another airframe ground point.

Figure 2.1.12 Electrical Module Assembly Installation

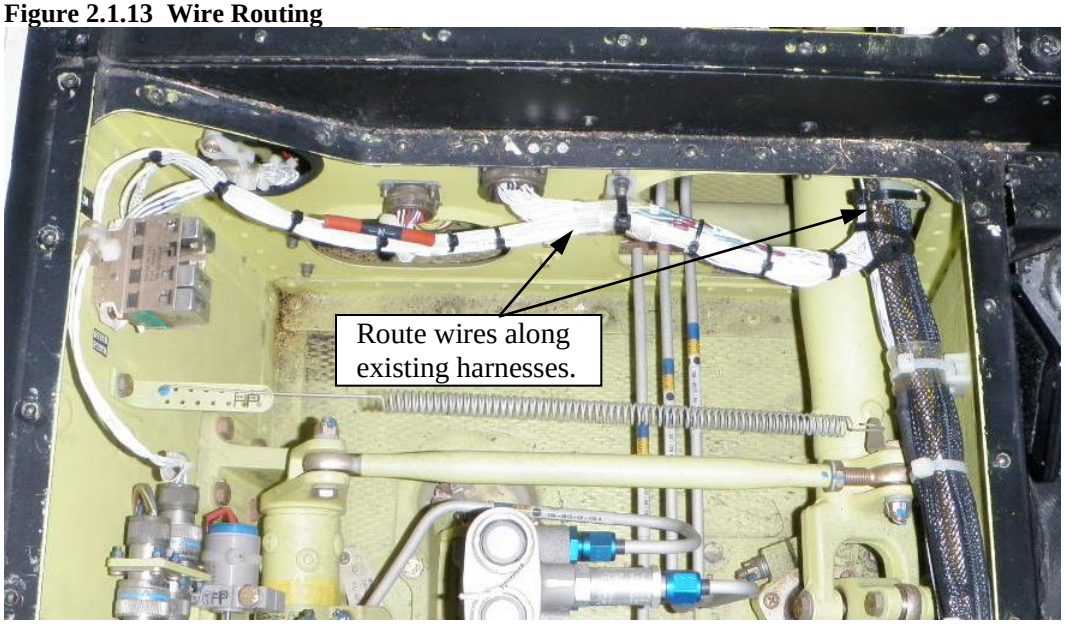


2.1 Fixed Provisions Kit Installation continued

2.1.4 Electrical Release Wiring Installation continued

- Cut to length if necessary and terminate the M364A20 wire from harness P/N 270-180-00 from the circuit breaker panel at module 1, pin A.
- Cut M362A16 wire to length if necessary, crimp the supplied ring terminal P/N 410-296-00 on, and terminate it at relay K8501, connection point A1.
- Working with harness P/N 270-179-00 and working below the helicopter feed the two wires (M405A16 and M390A16N) from the connector (connector no. J8505) up through the hole in the belly at STA 1555.0.
- If installing the Load Weigh System, feed the LOAD CELL wire through the hole in the belly at STA 1555.0 and terminate the individual wires in connector J8505 per the schematic in Section 2.4.
- Mount the J8505 connector within the connector bracket (P/N 232-463-00 installed per Section 2.1.2) with four screws (P/N 510-481-00), washers (P/N 510-062-00), and nuts (P/N 510-029-00).

Figure 2.1.13 Wire Routing



- Route wire M405A16 from the J8505 connector of harness P/N 270-179-00 to relay K8503, cut to length if necessary, crimp on ring terminal P/N 410-296-00 and terminate to connection point A2 of the relay.
- Route wire M390A18N to the grounding module (TB8552) of the Electrical Assembly, crimp on contact P/N 410-312-00 and terminate at pin C.

2.1 Fixed Provisions Kit Installation continued

2.1.4 Electrical Release Wiring Installation continued

- Route individual wires from the electrical module assembly to the pilot's cyclic disconnect (P7940) per the following.
  - Wire M367A20 from module 1, pin B to pin 51.
  - Wire M366A20 from module 2, pin F to pin 52.
  - Wire M368A22 from module 2, pin B to pin 46.
  - Wire M376A22 from module 2, pin G to pin 43.
- Route individual wires from the electrical module assembly to the co-pilot's cyclic (if installed) disconnect (P7934) per the following.
  - Wire M375A22 from module 1, pin C to pin DD.
  - Wire M377A22 from module 2, pin L to pin EE.
  - Wire M374A22 from module 2, pin C to pin Y.
  - Wire M376A22 from module 2, pin K to pin V.
- For the "Hook Armed" illumination light:
  On the A109E model route wire M393A22 to the helicopter's J8615 connector.

  On the A119 and *AW119 MkII* models without an integrated display system (IDS) route wire M393A22 to the helicopter's P7605J1 connector.

  On the A119 and *AW119 MkII* models with an integrated display system (IDS) route wire M408A22 to the helicopter's TB7603/1 connector.

  NOTICE

  Refer also to the Agusta cargo hook wiring diagrams for additional details on the shipside wiring.
- Install the J8502, J8501, J8505, and J8506 decals from the P/N 215-255-00 decal sheet near the respective connections (see wiring schematic).

Figure 2.1.14 Internal Electrical Release Schematic – A109E and A119/AW119 MKII without IDS

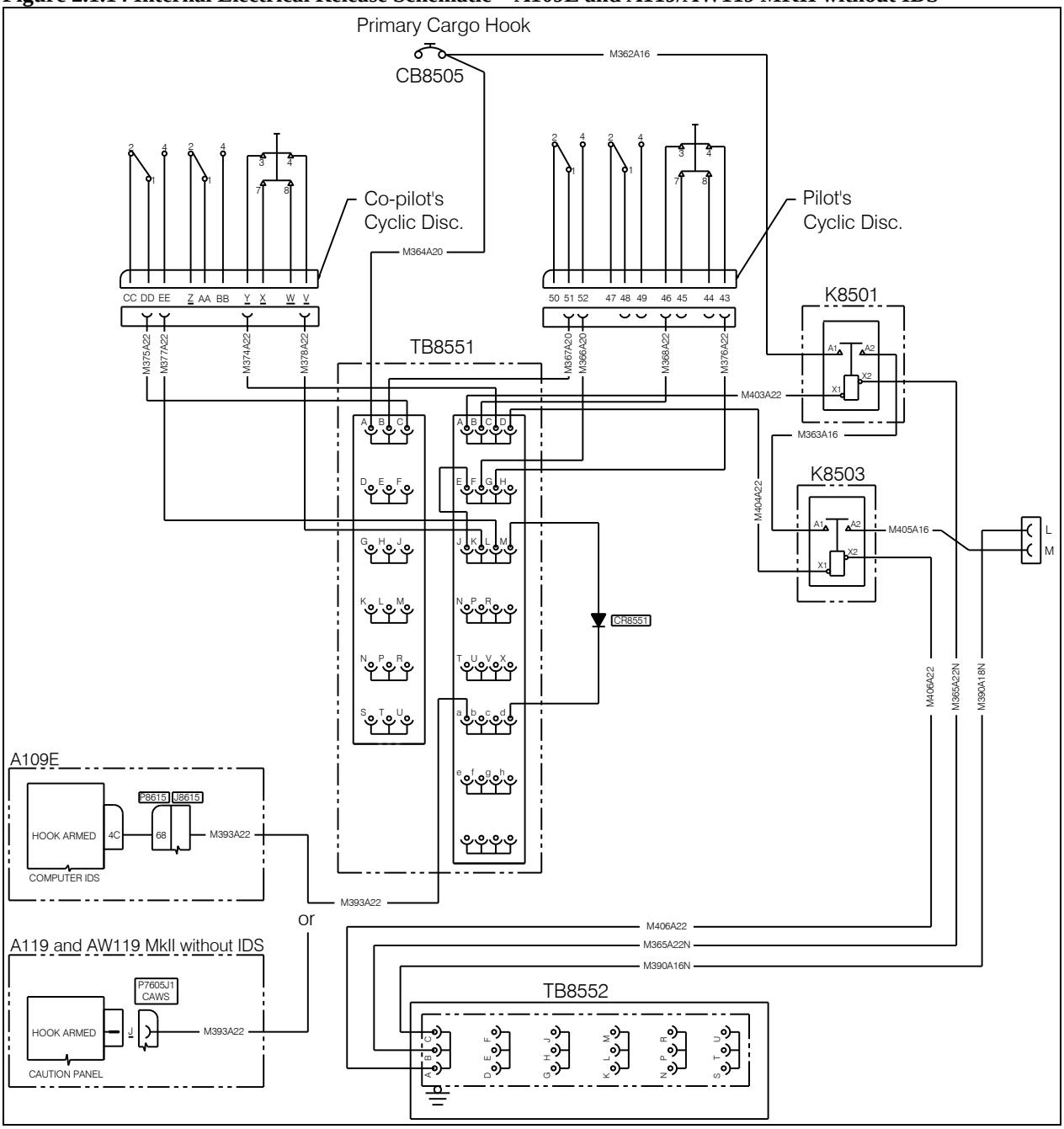
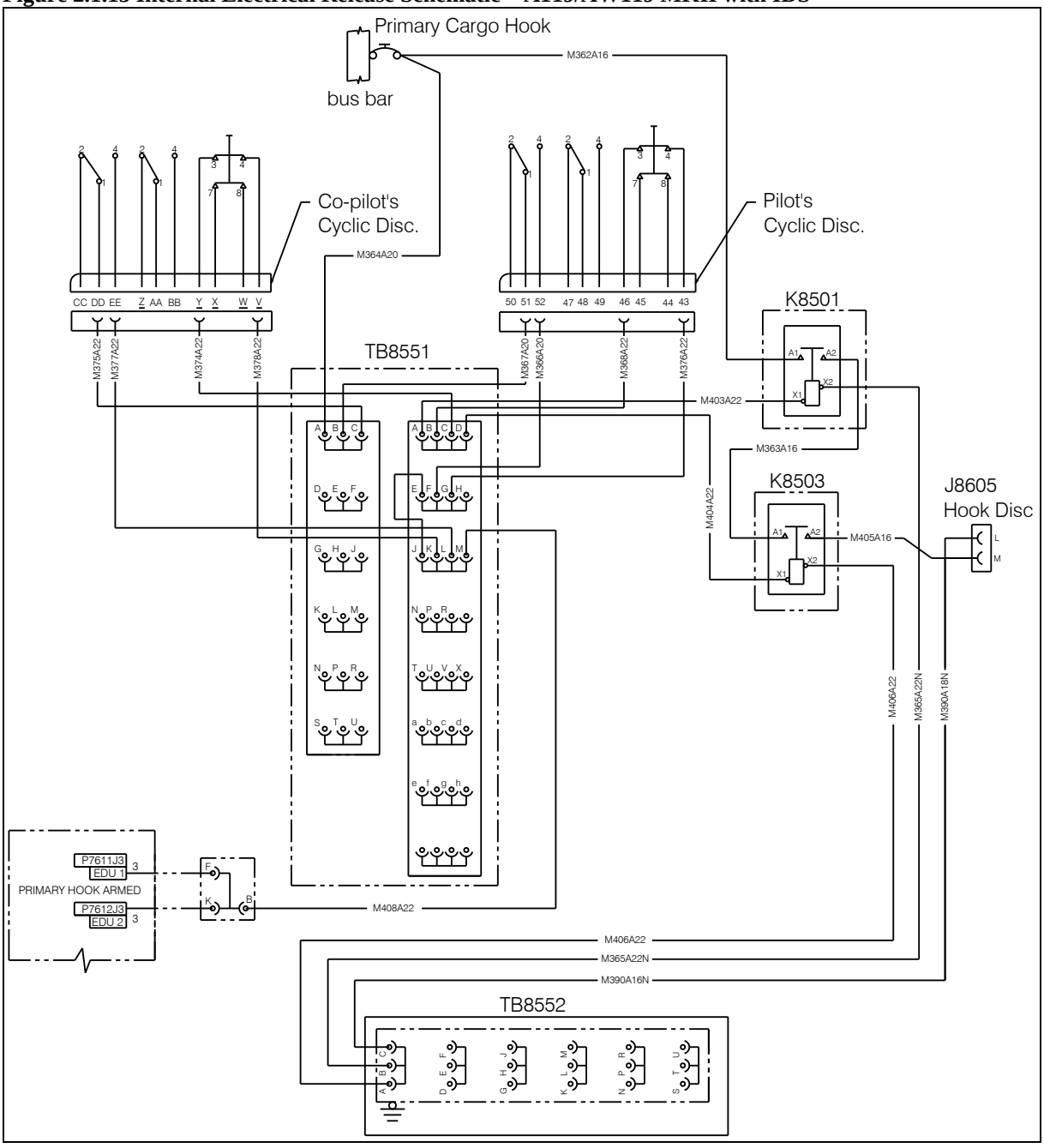


Figure 2.1.15 Internal Electrical Release Schematic – A119/AW119 MKII with IDS



2.1 Fixed Provisions Kit Installation continued

2.1.4 Electrical Release Wiring Installation continued

The Intermediate Electrical Harness (P/N 270-178-00) is installed external to the aircraft and is routed from the forward connector bracket back to the aft connector bracket and is secured along the hydraulic hose. It serves as an intermediate harness between the internal cargo hook electrical wiring, including load weigh system wiring if installed, and the harnesses on the cargo hook suspension assembly (see Figure 2.1.16).

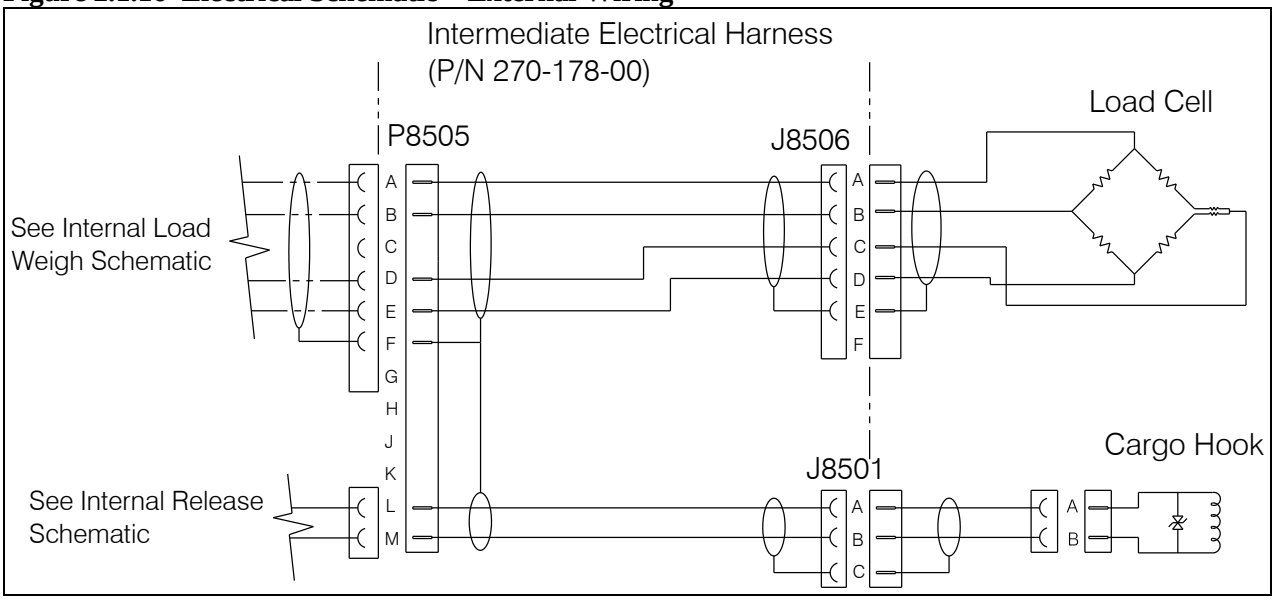
NOTICE

On the A119 models the forward skid gear tube will need to be lowered from the belly in order for the electrical harness connector(s) to be routed through.

Connect the single connector end (P8505) to the mating connector mounted within the forward connector bracket and route it along the hydraulic hose, securing it to the hydraulic hose at locations 2.0/4.0 inches from and on both sides of each adel clamp with ty-wraps (P/N 512-003-00).

Mount the cargo hook electrical release (J8501) and the load cell (J8506) connectors to the aft connector bracket with screws (P/N 510-672-00), washers (P/N 510-062-00), and nuts (P/N 510-029-00).

Figure 2.1.16 Electrical Schematic – External Wiring



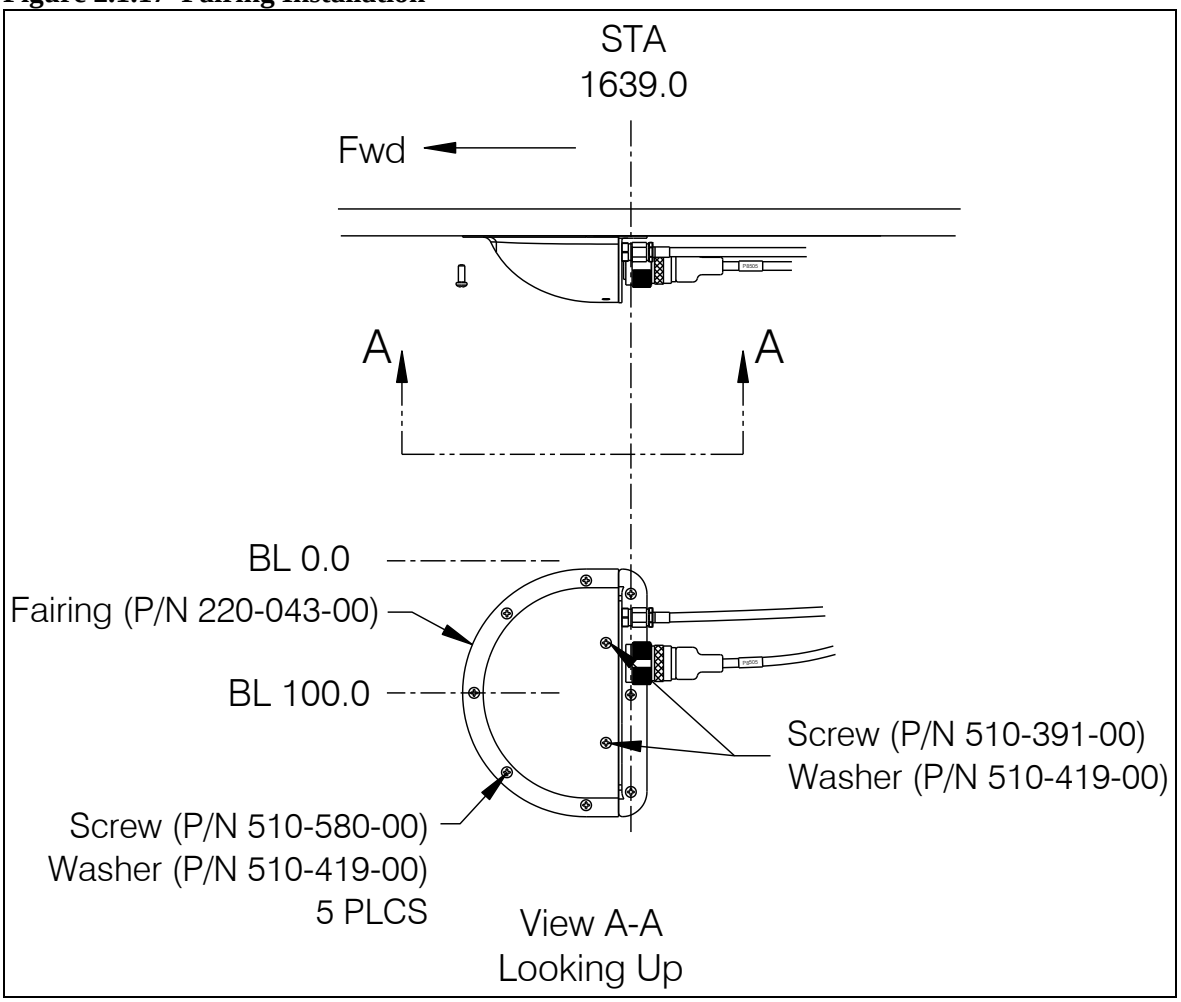
2.1 Fixed Provisions Kit Installation continued

2.1.5 Connector Bracket Fairing Installation

When the electrical wiring and hydraulic hose installation is completed, the Fairing (P/N 220-043-00) can be installed over the forward connector bracket.

Position the Fairing over the forward connector bracket and align the holes and secure it to the bracket in two places and to the inserts in the belly of the helicopter in five places with the fasteners as shown in the figure below.

Figure 2.1.17 Fairing Installation



2.1.6 Placard Installation

Install the "Carrying of External Loads" placard, part of the P/N 215-255-00 sheet of placards, in the cockpit in a location visible to the pilot.

2.1 Fixed Provisions Kit Installation continued

2.1.7 Landing Gear Lock Installation

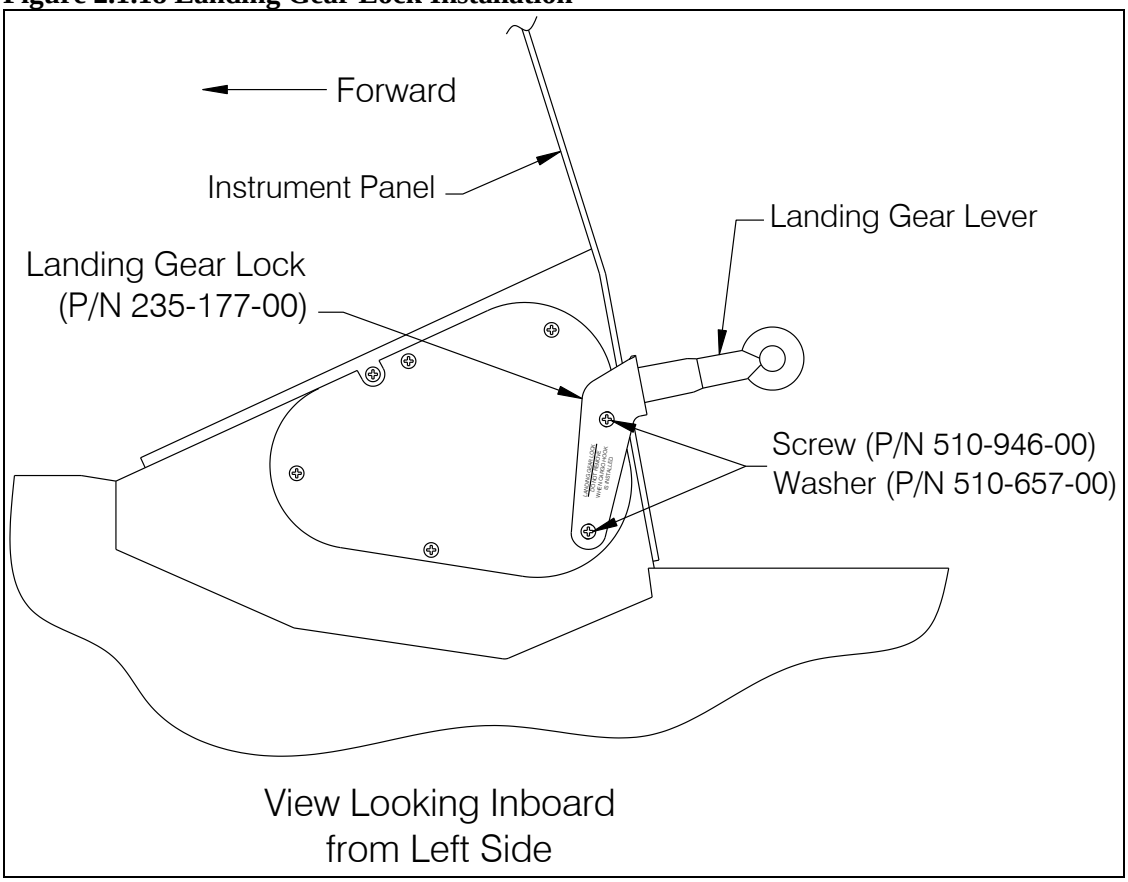
NOTICE

The Landing Gear Lock installation is applicable to kit P/N 200-355-00 for the A109E only. If installing kit P/N 200-369-00, skip this section.

The Landing Gear Lock (P/N 235-177-00) prevents the landing gear from being retracted when the cargo hook suspension is installed.

- Remove the two screws and washers at locations shown below from the access panel to the left of the landing gear lever.
- Position the Landing Gear Lock over the two holes and to capture the Landing Gear Lever to prevent actuation and secure with hardware as shown in Figure 2.1.18.

Figure 2.1.18 Landing Gear Lock Installation

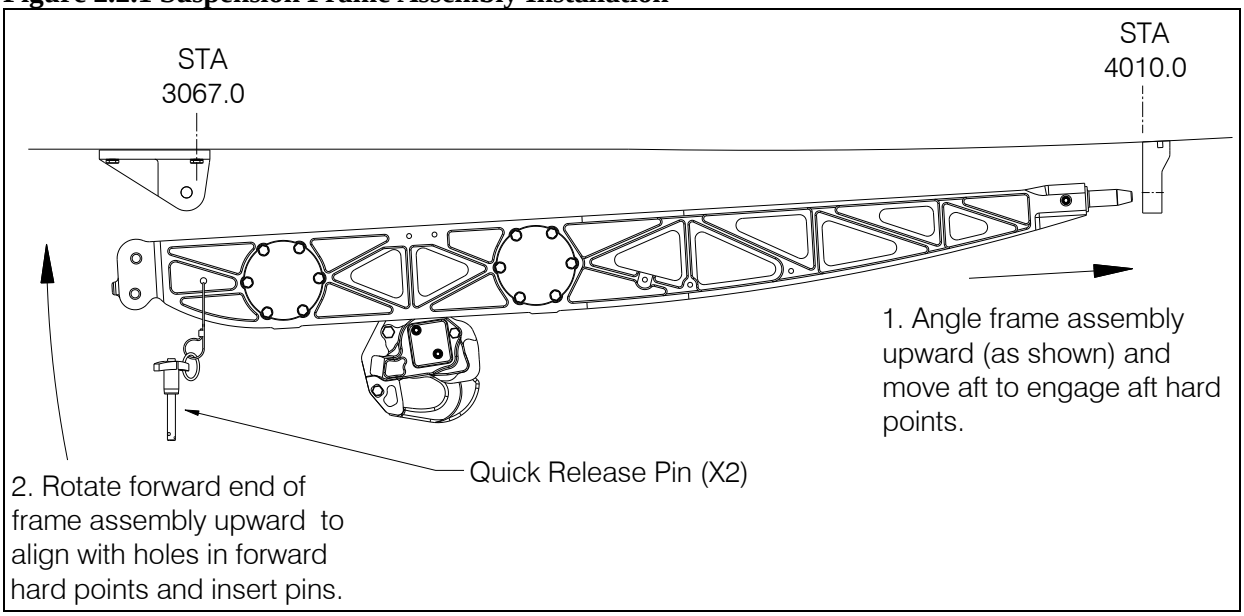


2.2 Cargo Hook Suspension Kit Installation

This section covers the installation of the cargo hook suspension kit, P/N 200-356-00 which includes the cargo hook suspension assembly P/N 210-244-00. Install the cargo hook suspension assembly per the following.

- If load weigh kit P/N 200-357-00 is being installed, modify the cargo hook suspension assembly per Section 2.3.
- Install the cargo hook suspension assembly (P/N 210-244-00) onto the hard points as shown in Figure 2.2.1.

Figure 2.2.1 Suspension Frame Assembly Installation



- Secure the quick release pins with the attached safety pins.
- Connect the hydraulic hose connector, the electrical release harness connector, and load weigh harness connector (if load weigh kit is being installed) to their respective mating connectors on the Aft Connector Bracket installed earlier.

Table 2.1 Cargo Hook Connector

Pin	Function
A	Ground
B	Power

CAUTION

Earlier versions of the cargo hook were equipped with a suppression diode that will be damaged if the electrical connection is reversed.

2.2 Cargo Hook Suspension Kit Installation continued

- Install appropriate load limitation placard, P/N 215-256-00 (3086 lb external load limit) for the A119 and AW119Mk II model or P/N 215-258-00 (2205 lb external load limit) for the A109E model. Consult the Agusta Flight Manual Supplement applicable to your particular helicopter to verify the external load limitation. Locate the placard on the belly of the helicopter or on the cargo hook suspension frame, visible to the ground operator and near the cargo hook.

2.3 Load Weigh Kit Installation (Kit P/N 200-357-00)

The load weigh kit (P/N 200-357-00) is an optional kit that may be installed with the cargo hook suspension kit.

NOTICE

If not installing the load weigh kit, skip this section and proceed to Installation Checkout.

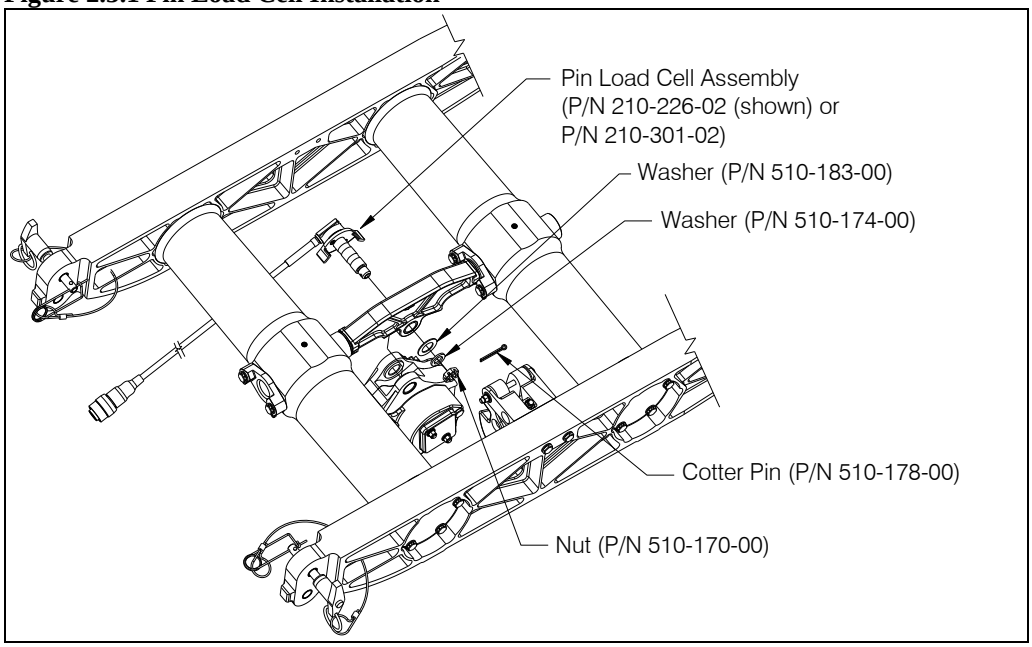
There are three primary components to install – the pin load cell, the internal electrical harness and the load weigh indicator. Refer to the following sections for installation instructions for each.

2.3.1 Pin Load Cell Installation

The pin load cell replaces the cargo hook attach bolt (P/N 290-332-00) in the suspension assembly. It is installed per the following.

- ❑ Remove the nut (P/N 510-170-00), washer (P/N 510-174-00) and washer (P/N 510-183-00) from the end of the attach bolt.
- ❑ Remove the attach bolt (P/N 290-332-00) and washer (P/N 510-183-00) from the cargo hook, separating the cargo hook from the suspension beam. The bolt and washer are not used with the load weigh installation.
- ❑ Install the pin load cell through the cargo hook and suspension beam. Install so that the head (harness end) of the load cell is to the right.

Figure 2.3.1 Pin Load Cell Installation



2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

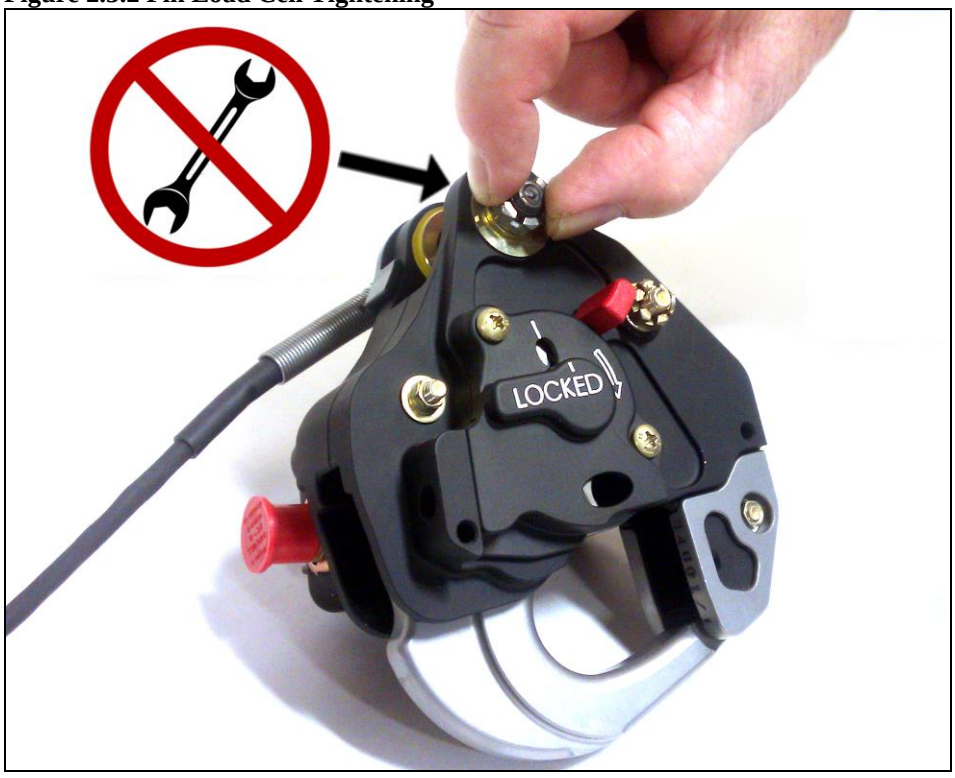
2.3.1 Pin Load Cell Installation continued

- Install nut (P/N 510-170-00), washer (P/N 510-174-00) and washer (P/N 510-183-00) onto the end of the pin load cell. Tighten nut to until fully seated, finger tight only. Back off to previous castellation, if needed to and insert cotter pin (P/N 510-178-00). Install and secure cotter pin.

⚠ CAUTION

Do not tighten nut on pin load cell more than finger tight. Over-tightening will damage load cell.

Figure 2.3.2 Pin Load Cell Tightening

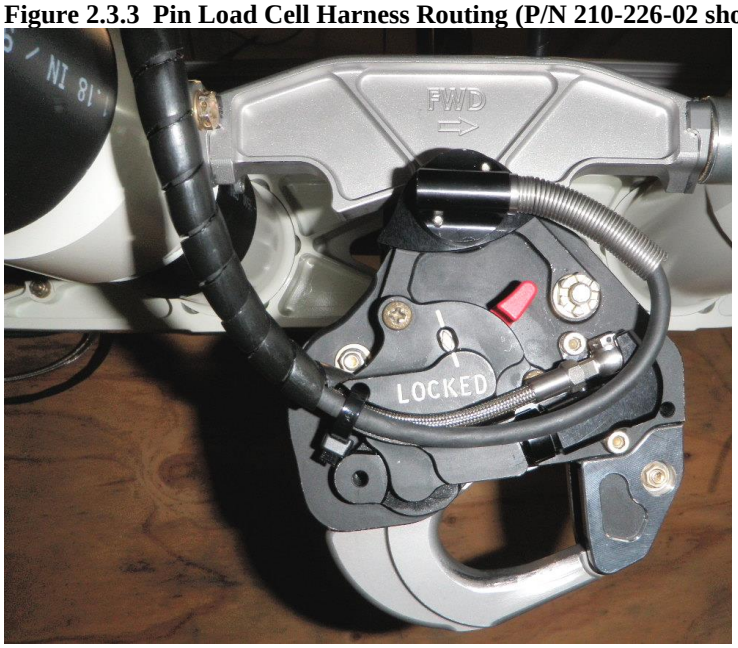


2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.1 Pin Load Cell Installation continued

- Route the pin load cell harness from the load cell to the hydraulic hose at the cargo hook as shown below.

Figure 2.3.3 Pin Load Cell Harness Routing (P/N 210-226-02 shown)



- Remove the spiral wrap over the electrical release harness and the hydraulic hose and remove the cushioned loop clamp at the top of the aft cross tube.
- Replace this cushioned loop clamp with the larger cushioned loop clamp (P/N 512-006-00) and install it over the bundle which now includes the pin load cell harness. Before tightening the screw at this cushioned loop clamp, rotate the cargo hook throughout its full range of motion and verify there is adequate slack in the hose and harnesses.
- At the LH side frame remove the cushioned loop clamp and replace with the larger cushioned clamp (P/N 512-006-00) supplied with the load weigh kit. Re-use the existing hardware.
- Route the pin load cell harness forward and connect its connector to the mating connector on the aft bracket.

2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.2 C-39 Indicator Installation

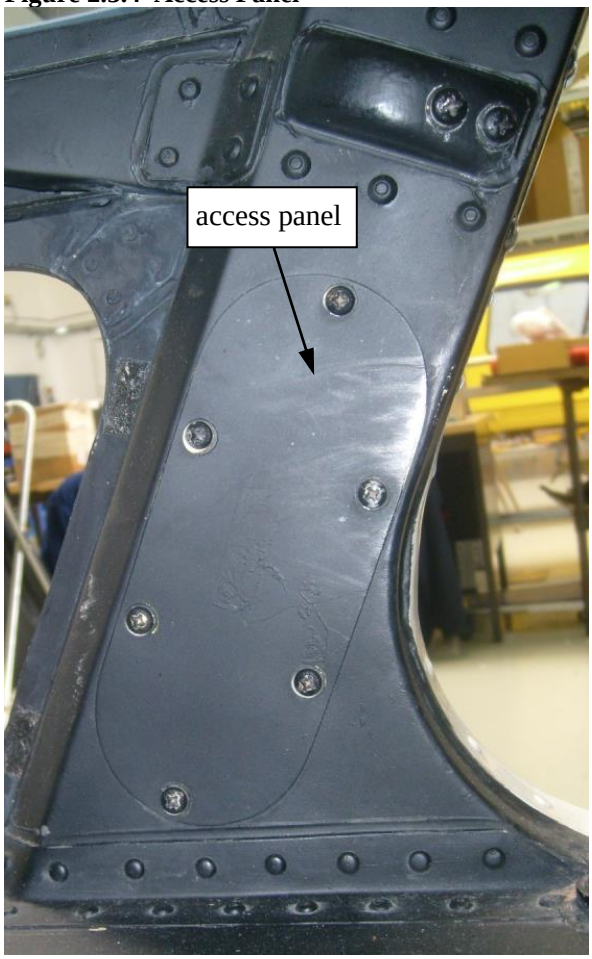
The C-39 Indicator, as part of the load weigh system, provides the reading of the load being carried on the cargo hook.

Brackets are provided with the kit to mount the C-39 Indicator to the right side forward door post using existing holes or it may also be mounted within the instrument panel using a standard 2 ¼" hole.

To install the indicator on the right side forward door post, perform the following.

- Remove the existing access panel on the door post by removing six screws.

Figure 2.3.4 Access Panel



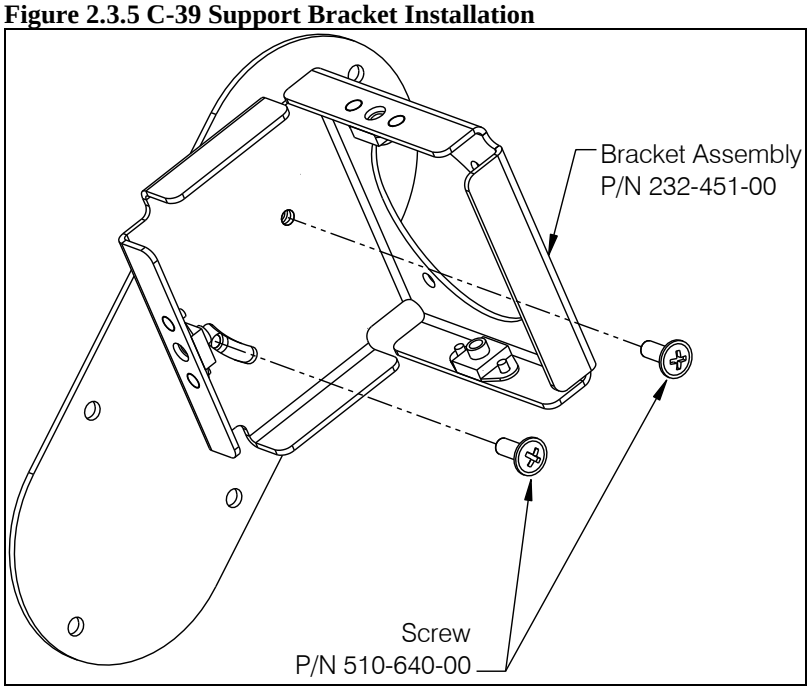
- Install the provided C-39 Mounting Plate Assembly (P/N 232-452-00) in place of the removed access panel. This Mounting Plate Assembly incorporates nut plates for mounting the C-39 Bracket Assembly (P/N 232-451-00).

2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.2 C-39 Indicator Installation continued

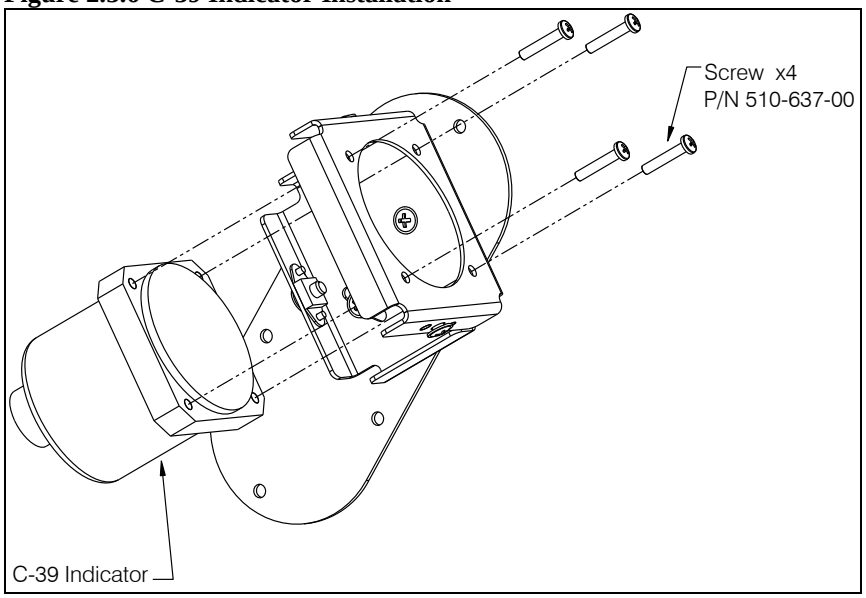
- Attach the C-39 Bracket Assembly to the Mounting Plate Assembly using two screws (P/N 510-640-00). Adjust the Support Bracket within the range permitted by the slotted hole to the desired angle and secure in this position by tightening the screws.

Figure 2.3.5 C-39 Support Bracket Installation



- Install the four instrument mounting nuts (P/N 510-639-00) into the four mounting holes in the C-39 Indicator.
- Install the C-39 Indicator (P/N 210-095-02 or P/N 210-095-05) onto the bracket with four screws (P/N 510-637-00) as illustrated below.

Figure 2.3.6 C-39 Indicator Installation

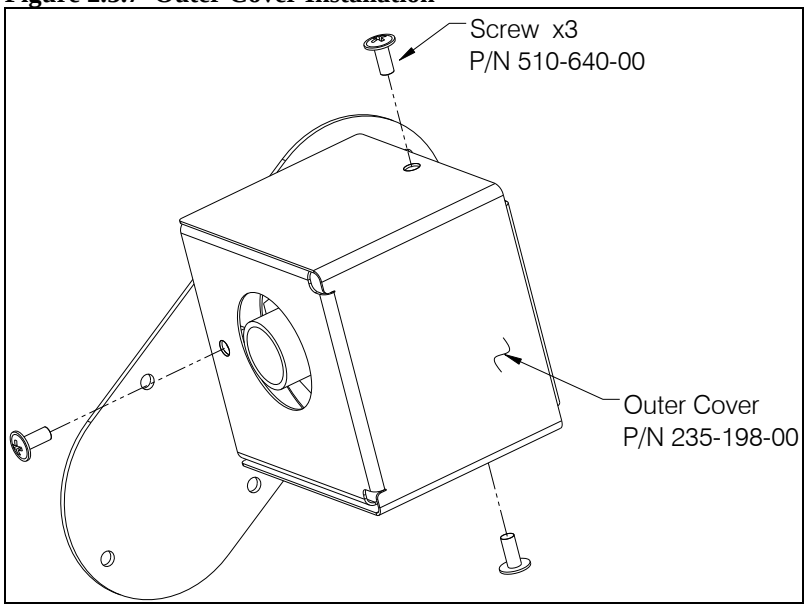


2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.2 C-39 Indicator Installation continued

- Install Outer Cover (P/N 235-198-00) over the bracket with three screws (P/N 510-640-00) as illustrated below.

Figure 2.3.7 Outer Cover Installation



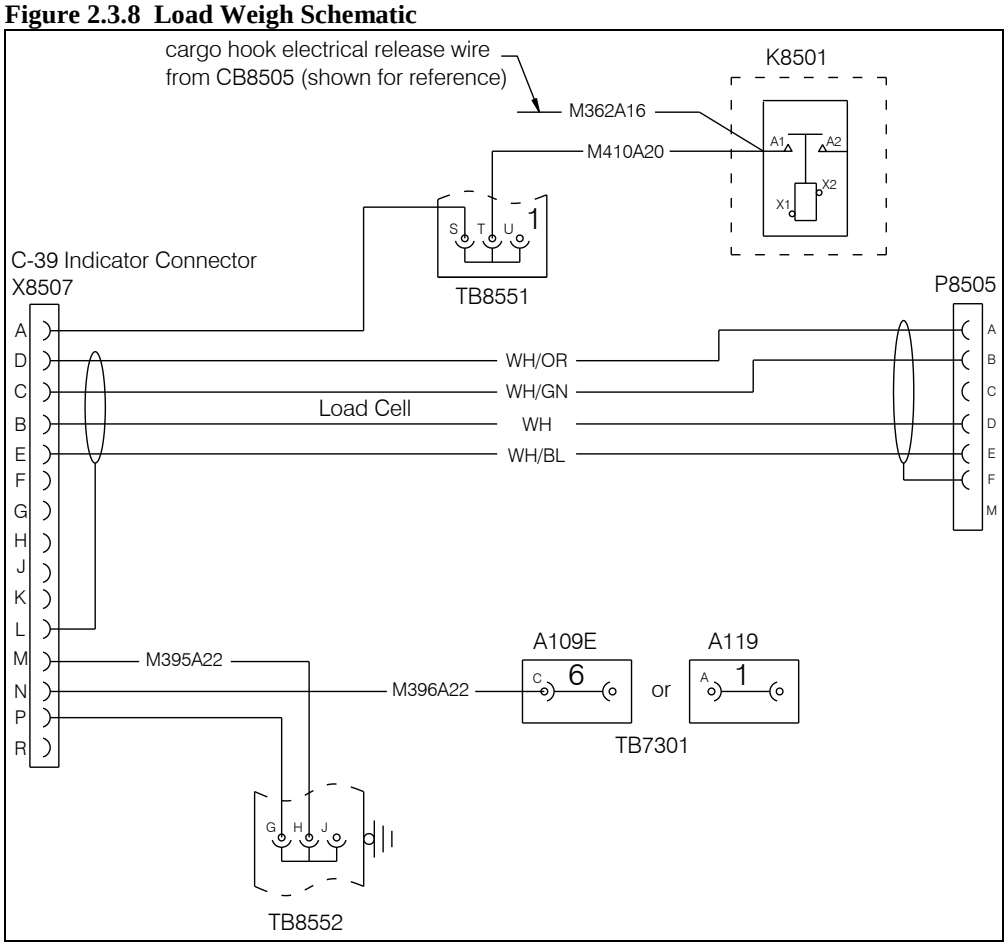
2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.3 Load Weigh Internal Harness Installation

The electrical schematic for the load weigh system is shown in Figure 2.3.7.

The primary leg of the load weigh harness (labeled "LOAD CELL") is routed from the C-39 indicator to the bracket at the belly of the helicopter. Route with existing harnesses and cut to length if necessary. Strip back outer jacket of the four conductor wire and prep the end and install shield termination (P/N 410-199-00) per Figure 2.3.8. Crimp on supplied pins (P/N 410-314-00) and insert pins into the P8505 connector per the schematic shown in Figure 2.3.9.

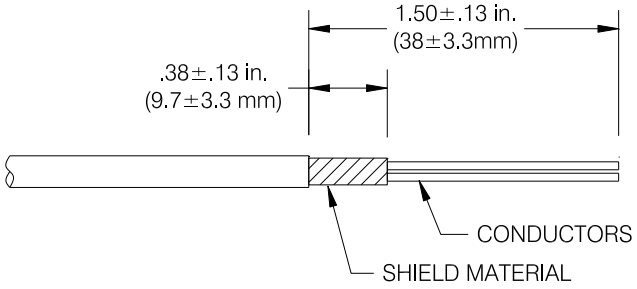
Figure 2.3.8 Load Weigh Schematic



2.3 Load Weigh Kit Installation (Kit P/N 200-357-00) continued

2.3.3 Load Weigh Internal Harness Installation continued

Figure 2.3.9 Shield Terminations



INSTALL SHIELD TERMINATIONS PER THE FOLLOWING:

1. PREPARE CONDUCTOR AS SHOWN ABOVE.
2. INSTALL SHIELD TERMINATION OVER CENTER OF EXPOSED SHIELD MATERIAL.
3. APPLY HEAT FROM HEAT GUN TO TERMINATION UNTIL SOLDER RING MELTS AND THE TERMINATION HAS SEALED THE CABLE. VERIFY THAT CONTINUITY EXISTS FROM THE DRAIN TO THE SHIELD.

- Route wire M395A22N from the C-39 indicator connector to the grounding terminal block TB8552, pin H of the electrical module assembly supplied with the fixed provisions kit P/N 200-355-00 and 200-369-00.

- Route wire OB-M01A22N from the C-39 indicator connector to terminal block TB8552 where it is terminated at pin G.

- For the C-39 indicator 5VDC back lighting, route wire M396A22 from the C-39 indicator connector to TB7301 where it is terminated at module 1, pin A (on the A119) or module 6, pin c (on the A109E) or other available pin to accommodate the 5VDC lights.

- Wire OB-M02A22 is routed from the C-39 indicator to TB8551 where it is terminated at module 1, pin S.

- Install Jumper (P/N 270-182-00, wire no. M410A20) between TB8551 module 1, pin T and relay K8501 point A1 of the electrical module assembly.

2.4 Hydraulic System Bleed Procedure

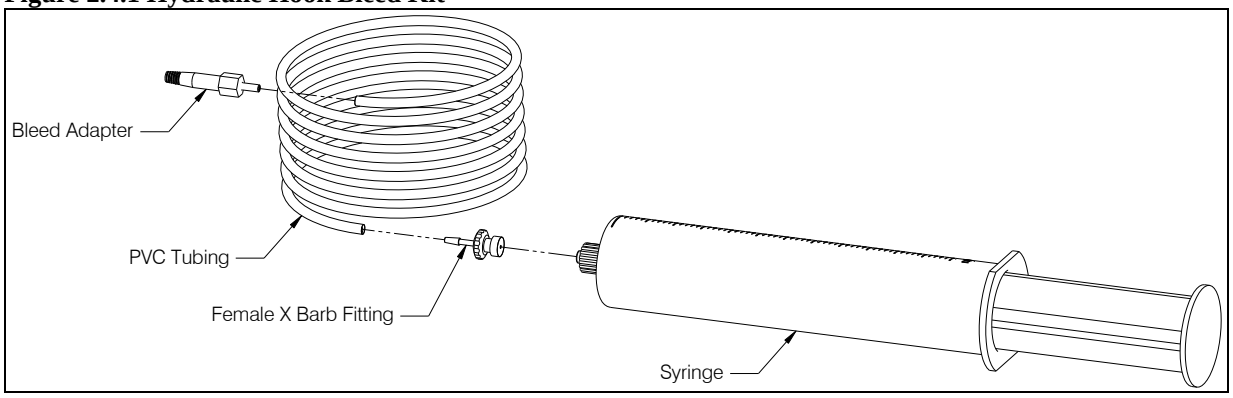
If there is a need to fill and/or bleed the system, follow the procedures listed below. Proper bleeding is critical to the operation of the hydraulic release system. An improperly bled system will not release the cargo hook mechanism. If you need to remove and repair any items in the hydraulic system, refer to 123-036-00, Instruction for Continued Airworthiness.

Filling and bleeding the hydraulic release system is most easily accomplished on the bench, prior to installation on the aircraft. This process may also be accomplished after the system is installed. Filling and bleeding requires two persons, one to inject hydraulic fluid through the system and the other to observe the reservoir.

Bleeding procedure:

1. Obtain the hydraulic hook bleed kit, 212-014-01. This kit consists of 2 ounces of MIL-PRF-5606 fluid (MIL-PRF-87257 fluid may also be used), a syringe, a female barb fitting, a length of PVC tubing, and a bleed adapter fitting. The bleed kit is included in new Hydraulic Hook kits. Assemble the bleed kit by press fitting each component as shown.

Figure 2.4.1 Hydraulic Hook Bleed Kit



2. If the system is already installed on the aircraft, place an absorbent towel under the master cylinder. If the master cylinder is not installed on the aircraft, lightly clamp the master cylinder in a vise to hold it in a vertical position and position the slave cylinder so that its level is below that of the master cylinder.

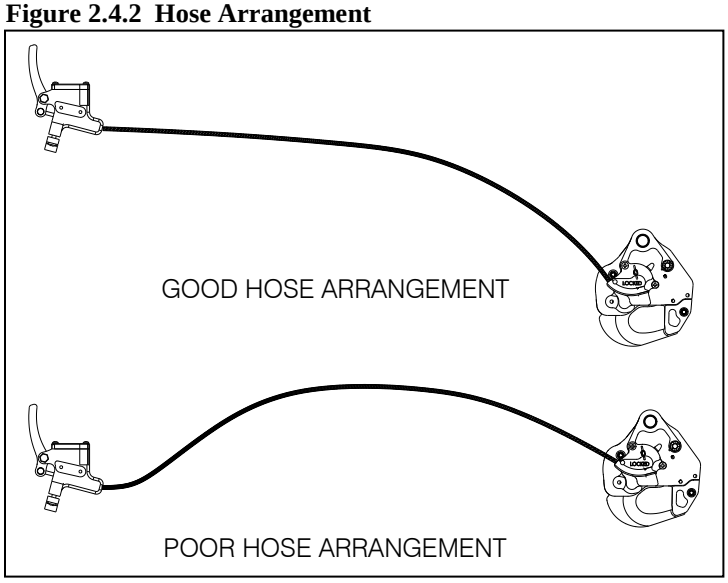
NOTICE

Use best shop practices to keep foreign material out of the hydraulic system. FOD will plug orifices, damage seals and/or scratch sealing surfaces necessitating system rebuild. Use only clean hydraulic fluid from sealed containers.

2.4 Hydraulic System Bleed Procedure continued

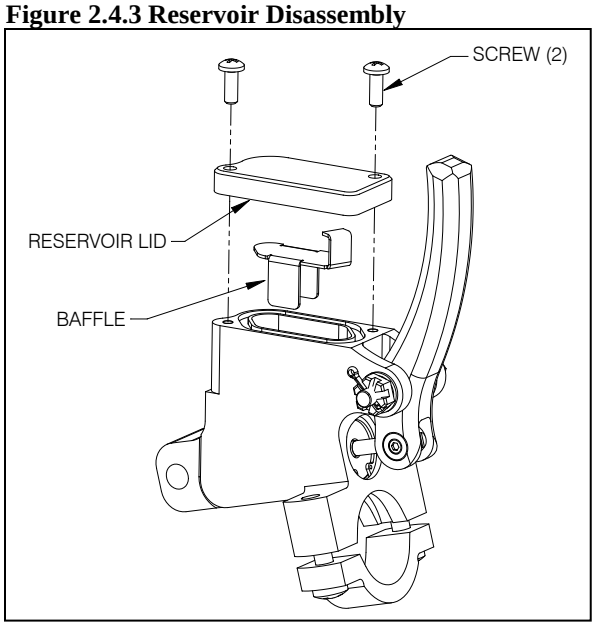
3. Connect the master cylinder assembly to the slave cylinder assembly if not already done. If filling or bleeding on the bench, as much as possible, arrange the hoses uncoiled, straight and running uphill. See Figure 2.4.2.

Figure 2.4.2 Hose Arrangement



4. Remove screws, reservoir lid, and baffle from the master cylinder reservoir as shown in Figure 2.4.3.

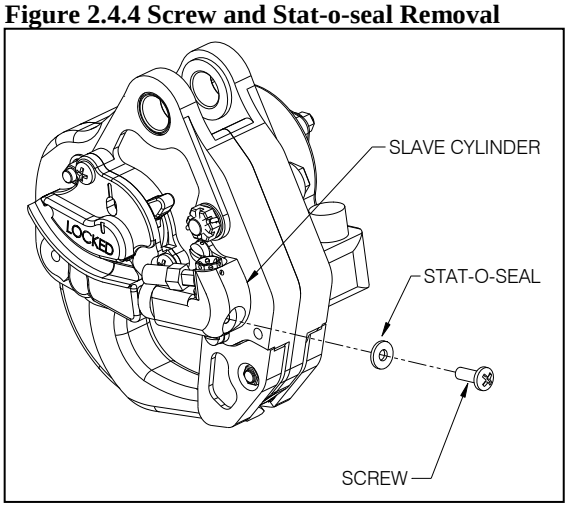
Figure 2.4.3 Reservoir Disassembly



2.4 Hydraulic System Bleed Procedure continued

5. Remove the screw and stat-o-seal on the slave cylinder, see Figure 2.4.4.

Figure 2.4.4 Screw and Stat-o-seal Removal



6. Fill the syringe with approximately 35 cc of MIL-PRF-5606 fluid and purge any remaining air in the syringe and tubing. Screw the end of the bleed adapter into the screw hole on the slave cylinder to create a tight seal. See figure 2.4.5.

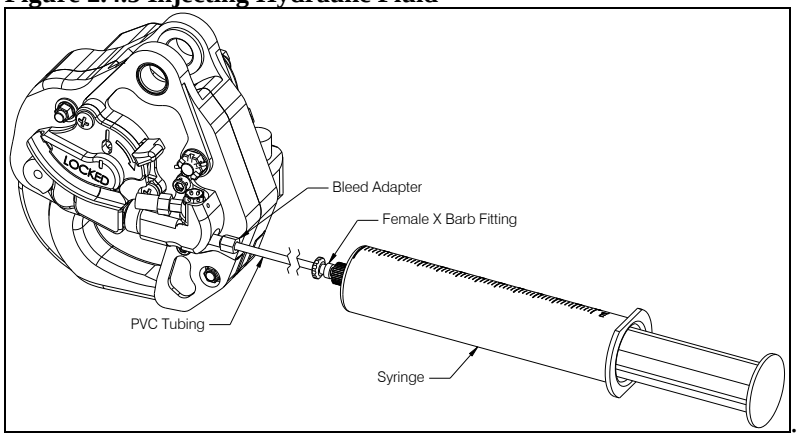
7. While observing the reservoir, **slowly** push on the syringe plunger to force fluid through the slave cylinder, hydraulic hose, and up to the master cylinder reservoir. There will be some resistance during filling—this is normal.

⚠ CAUTION

Injecting the fluid into the system too rapidly may cause the fluid to spray up and out of the master cylinder reservoir. Wear safety glasses when observing fluid reservoir while filling.

2.4 Hydraulic System Bleed Procedure continued

Figure 2.4.5 Injecting Hydraulic Fluid



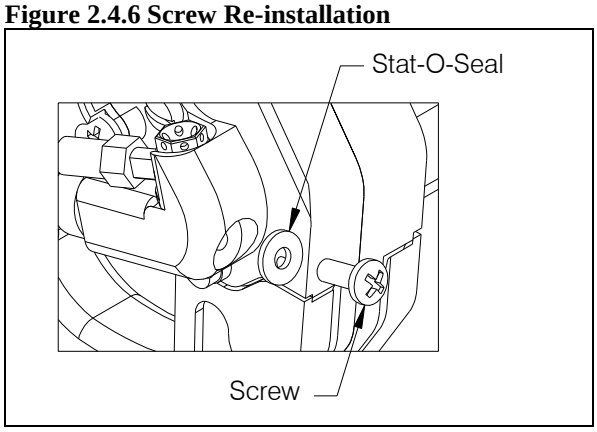
8. Continue to force fluid into the master cylinder reservoir until the reservoir is approximately half full.

NOTICE

If bleeding an already filled system, you may need to draw fluid from the master cylinder reservoir during this step to prevent overflow.

9. Remove the bleed adapter from the screw hole. Re-install the Thread-Seal (P/N 510-740-00), washers (P/N 510-209-00) and screw (P/N 510-694-00), see Figure 2.4.6.

Figure 2.4.6 Screw Re-installation



10. Allow the system to rest for several minutes. This will allow any air to rise through the system.

2.4 Hydraulic System Bleed Procedure continued

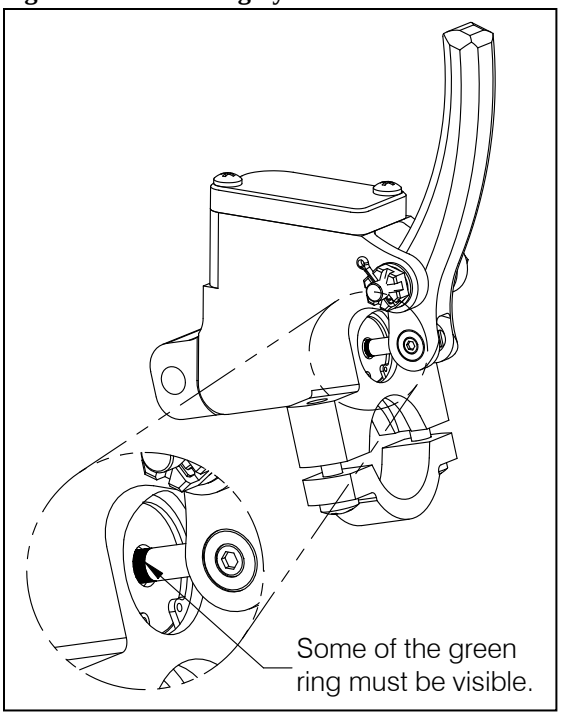
11. Very slowly pull the release lever on the master cylinder and watch for bubbles. If bubbles are observed rising within the reservoir, continue to slowly cycle the lever until there are no more. Actuating the lever releases air trapped within the master cylinder.

CAUTION

Pull the lever very slowly! When the reservoir is not baffled and capped, a hard pull will cause fluid to erupt over the edge of the reservoir.

12. Check the system for air by actuating the lever firmly until it bottoms out. Check the push rod position (see Figure 2.7.7). If some of the green area on the push rod is visible, proceed to step 13. If some of the green on the push rod is not visible with the lever completely pulled, the system has too much air in it and needs further bleeding. To do this, repeat steps 5 – 11.

Figure 2.4.7 Checking System for Air



13. After the system is properly bled, verify that the reservoir is approximately half full of hydraulic fluid. Fluid should be visible above the baffle.
14. Re-install the baffle, and the reservoir lid.
15. Check the system for proper operation. Fully actuate the release lever. The hook must open and the lever must have a firm feel.
16. Disassemble and thoroughly clean the bleed kit with isopropyl alcohol. Allow it to dry. Not cleaning the syringe will render it unusable. Re-assemble and store for next use.

2.5 Installation Check-Out

After installation of the system, perform the following functional checks.

- Swing the installed cargo hook to its full extremes to ensure that the hydraulic hose and electrical harnesses have enough slack to allow full range of motion without straining or damaging the hose or harnesses. The hose or harnesses must not be the stops that prevent the cargo hook from pivoting freely in all directions.
- With no load on the cargo hook load beam, pull lever on the cyclic, the cargo hook must release. Reset the cargo hook load beam.
- With no load on the cargo hook load beam, depress the cargo hook electrical release button on the pilot's cyclic, the Cargo Hook should release. Reset the cargo hook load beam.
- Perform an EMI ground test per AC 43.13-1b section 11-107. For equipment that can only be checked in flight an EMI flight test may be required.

The cargo hook and load cell are of a class of equipment not known to have a high potential for interference. This class of equipment does not require special EMI installation testing (i.e. FADEC) as required in paragraphs 7 and 8 of FAA policy memorandum ASW-2001-01.

If Load Weigh Kit (P/N 200-357-00) is installed perform the following:

- Power on the Indicator and allow it to warm up for 5 minutes (with no load on the hook). Press both Indicator buttons at the same time to go to the Setup Mode. Scroll through the menu until the symbol "0 in" is displayed, then press the right button. Remove any weight that is not to be zeroed out and press either button to complete the procedure.

2.6 Component Weights

The weights and cgs of the Cargo Hook Kits are listed below.

Table 2.6.1 Weight & CGs – Cargo Hook Kits

Item	Weight	Station
Fixed Provisions Kit, A109 P/N 200-355-00	8.5 lbs (3.9 kgs)	125.9 in. (3200 mm)
Cargo Hook Suspension Kit P/N 200-356-00	20.5 lbs (9.3 kg)	129.9 in. (3300 mm)
Load Weigh Kit* P/N 200-357-00	2.1 lbs (.95 kgs)	125.9 in. (3200 mm)
Fixed Provisions Kit, A119 P/N 200-369-00	8.5 lbs (3.9 kgs)	125.9 in. (3200 mm)

* The load weigh kit replaces the attach bolt and washer in kit P/N 200-356-00. The attach bolt and washer weigh 0.12 lbs.

2.7 Paper Work

In the US, fill in FAA form 337 for the initial installation. This procedure may vary in different countries. Make the appropriate aircraft log book entry. Place the Rotorcraft Flight Manual Supplement in the aircraft Flight Manual.

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Section 3

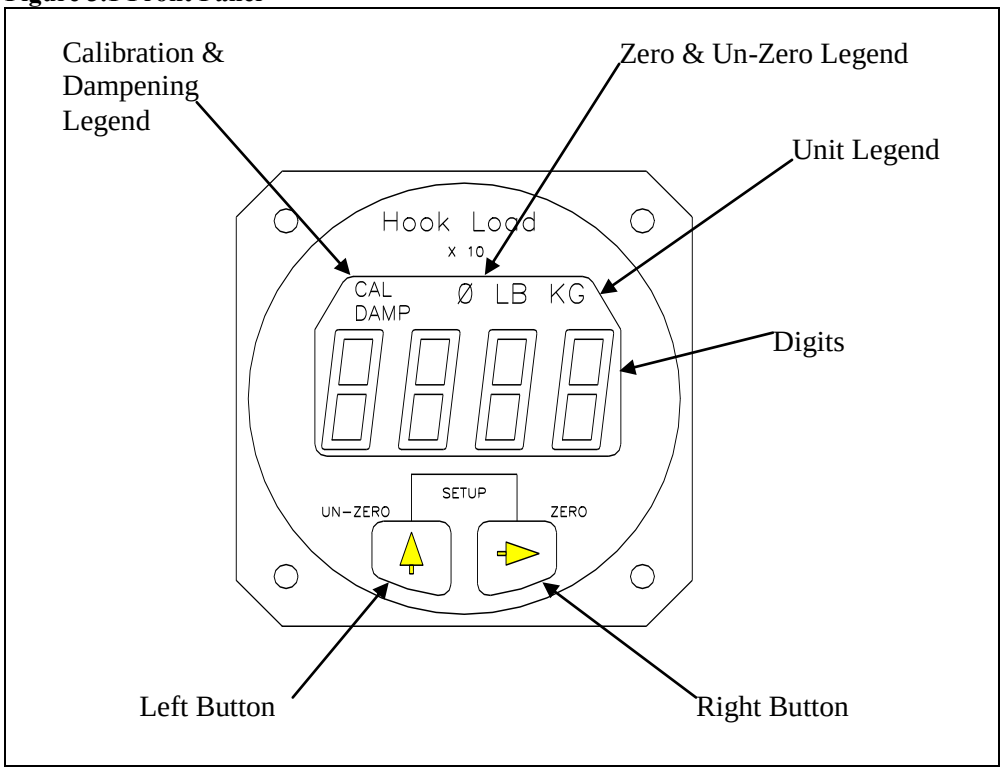
Load Weigh System Operation Instructions

Indicator Front Panel

The C-39 Indicator front panel includes the following features.

- The four 7 segment LCD digits show the weight on the Cargo Hook and display various setup information.
- The Legends clarify the digital display, i.e. - when the LB Legend is turned on, the display will be pounds, etc.
- The right button is used to Zero the display in the Run Mode and select the digit to be changed in the Setup Mode.
- The left button is used to Un-Zero the display in the Run Mode and scroll the selected digit in the Setup Mode.

Figure 3.1 Front Panel

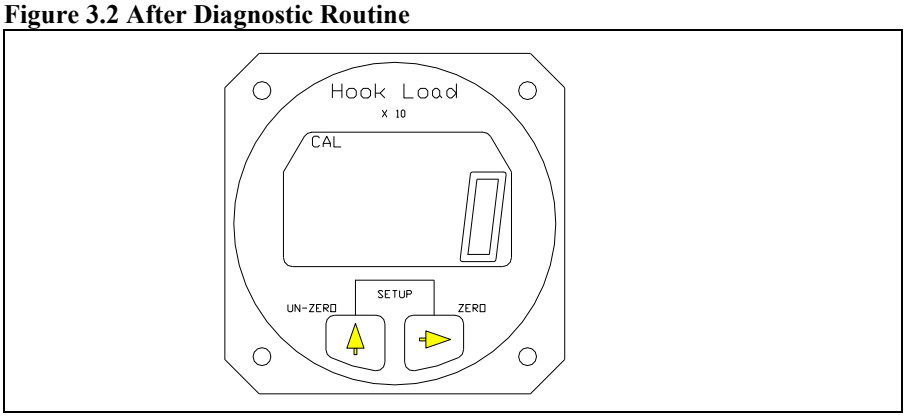


The Run Mode

The C-39 Indicator has two operating modes, Run and Setup. The Run Mode is used to display the cargo hook weight and the Setup Mode is used to setup or configure the Indicator to the helicopter and to the Load Cell. When powered up, the Indicator always comes on in the Run Mode.

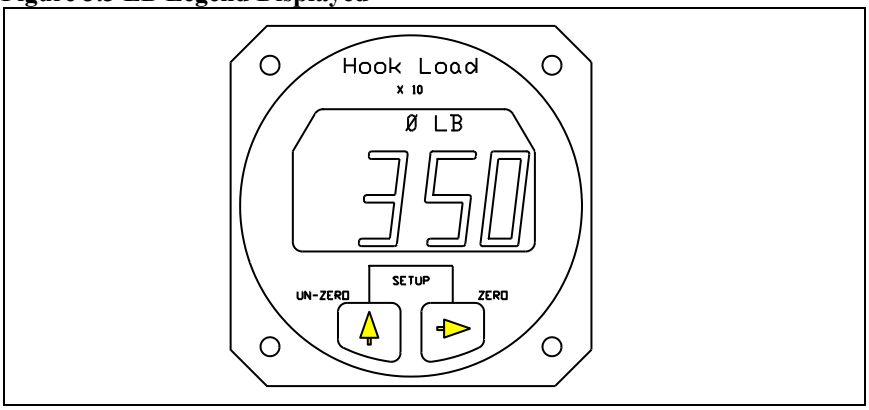
After the Indicator has been correctly installed, power it up by activating the aircraft electrical system. The Indicator will go through a self-diagnostic routine. During this routine the display will display all of the digits and legends. If a problem is found during the routine an Error Code will be displayed. For an explanation of Error Codes see the section *Error Codes*. After the diagnostic routine the display should look like this:

Figure 3.2 After Diagnostic Routine



The illustration is of the Indicator in the Run Mode with no load on the hook. Note the LB legend displayed.

Figure 3.3 LB Legend Displayed

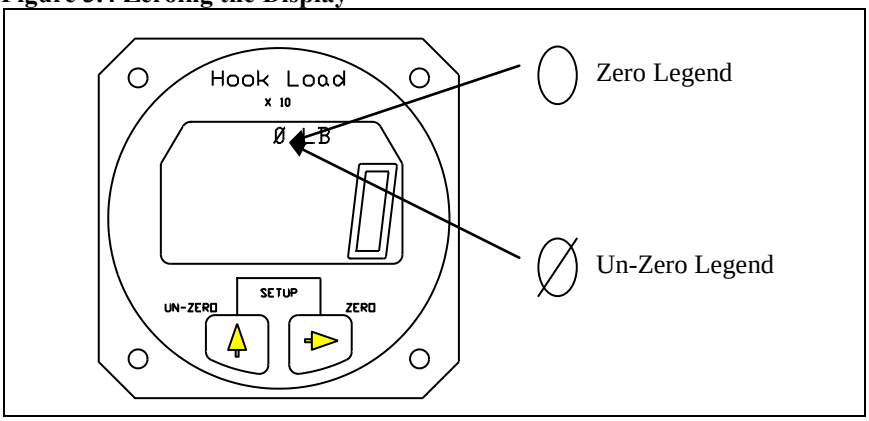


The illustration is a typical hook load reading. The display is 3,500 pounds, note the last digit is not displayed.

To Zero or Tare the Display

The zero feature is used to zero or tare the weight on the Cargo Hook that is not wanted, such as the weight of a cargo net or long line. The Right button is used to zero the Indicator reading. When the Right button is pressed the display is zeroed. The zero legend is turned on and the zeroed number is stored in memory. If the Right button is pressed again, before the Un-zero button is pressed, the display blinks in response to the button closure. Zero is only available in the Run Mode.

Figure 3.4 Zeroing the Display



To Un-Zero the Display

The Left button is used to add the zeroed value back into the current Indicator reading or Un-zero the display. When the Left button is pressed, the number previously zeroed is added to the current display and the Un-zero legend is turned on. If the Left button is again pressed before the zero button is pressed, the display blinks in response to the button closure. Un-Zero is only available in the Run Mode.

Error Codes

Error Codes are the result of difficulties discovered during the Indicator diagnostic tests. Diagnostic tests occur at power up and during the execution of certain routines. Listed below is a matrix of the Error Code displays, their meaning and possible corrective action. Pressing either button will usually bypass the error code, however, the displayed information may be suspect.

Table 3.1 Indicator Error Codes

DISPLAY	CAUSE	POSSIBLE CORRECTIVE ACTION
Err 1	A/D or D/A circuit failure	Potential short in the optional analog meter cable. Clear short and power cycle the Indicator by turning the power to the Indicator off for a few moments. If Error Code continues, return the Indicator to the factory.
Err 2	NV Ram failure	Power cycle the Indicator; if Error Code continues, return the Indicator to the factory.
Err 3	NV Ram write failure	Re-enter data, if Error Code continues, return the Indicator to the factory.
Err 4	NV Ram busy failure	Power cycle the Indicator, if Error Code continues return the Indicator to the factory.

The Setup Mode

The C-39 Indicator can be used with a wide range of helicopters and load cells. The Setup Mode on the Indicator matches the Indicator to the Load Cell and to the helicopter. This is done by entering data into the Indicator. Entered data includes the load cell Calibration Code, the units that the Indicator should read-out (pounds or kilograms), and several other items.

The Indicator has a group of Setup routines, arranged in menu form, that are used to configure the Indicator. Shown on the next page is a matrix of the Setup routines and a brief discussion of their function and how they are programmed. A complete discussion of each setup item is presented later in this section.

To enter the Setup Mode press both the Right and Left buttons at the same time while the Indicator is powered up and in the Run Mode. To exit the Setup Mode and return to the Run Mode, press both the buttons at the same time. If you are in a Setup routine and have started to change an entry, but you change your mind before completing the procedure, power cycle the Indicator to exit the Setup Mode and then go to the Run Mode without changing the item. The Indicator is power cycled by turning the Indicator power off for a few moments.

The Setup Mode, continued

Table 3.2 Indicator Setup Routines

MENU	FUNCTION	DISPLAY
Press the Left button to scroll through the menu	Press the Right button to view or change the menu item.	To return to the Run Mode press both the Right and Left buttons at the same time.
DAMP	Dampening Level, sets the pilots preference for display dampening.	Blinking display is previously entered Dampening Level. Select the desired dampening level by pressing the Left button.
CODE	Calibration Code, matches the Indicator to the Load Cell.	Display is previously entered CAL Code. The Code is changed by selecting the digit to be changed with the Right button. The selected digit will blink. Change the blinking digit by pressing the Left button.
0 in	Installation ZERO, matches the Indicator to the installed Load Cell and to the helicopter. After this procedure the display will be zero when no load is on the Cargo Hook.	Display is a combination of load on the Load Cell, and normal load cell zero offset. Remove all weight from the installed Load Cell except the Cargo Hook, and press any button to complete the procedure and return to the Run Mode.
LOAD	Load, is used to calibrate the system by lifting a known load.	No previous display is shown. Enter the known load using the Right button to select the digit to be changed and Left button to enter the number. Known load is entered "X 10" i.e.; 5000 kilograms is entered as 500. After the known load is entered, press both buttons at the same time and lift the known load. When the load is stabilized press either button. A new Calibration Code will be calculated and the known load will be displayed. This completes the procedure.
Scale	Scale, matches the analog output of the Indicator to an optional remote analog meter.	Display is previously entered number. To change the number use the Right button to select a digit, use the Left button to scroll the digit to the desired number. Entry is times 10.
LB KG	Units, selects the Indicator units (pounds or kilograms).	Display is previously selected unit. To change the unit, use the Left button.
XX - V	Version, is the revision level of the Indicator hardware and software.	Version is for information only, it cannot be changed.

The Setup Mode, continued

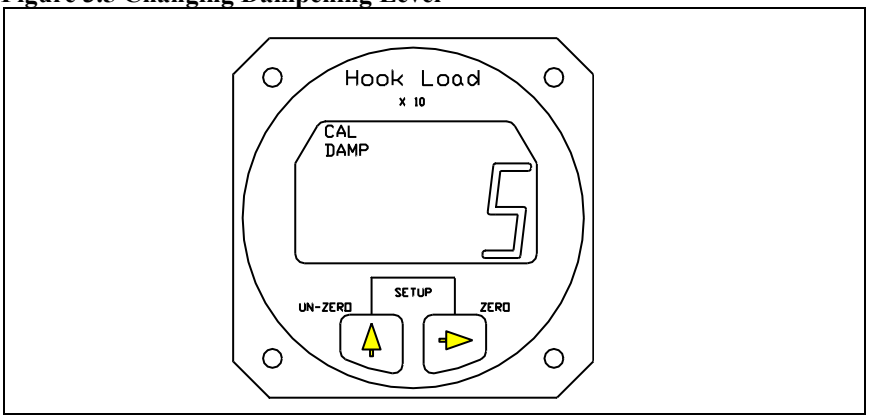
Indicator Dampening

The Damp or dampening routine allows the pilot to adjust the Indicator dampening level to his preference. The dampening routine is a program that stabilizes the Indicator reading. It offers a trade-off between Indicator responsiveness and stability. Ten dampening levels are available, from 0 through 9. At level 0 the display responds to the slightest change in weight. However, if the load bounced even slightly, the display digits would respond instantly, making the display look unstable. With a dampening level of 9, the display would be stable under the most turbulent conditions, however, it would take several seconds for the display to respond to a change in weight. The ideal dampening level will depend on the flying conditions. A mid range setting of 5 or 6 is usually adequate.

To Look at or Change the Dampening Level

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu, using the Left button, until the word DAMP is displayed. To look at or change the Dampening Level press the Right button. The display should look like this:

Figure 3.5 Changing Dampening Level



The CAL and the DAMP legend is turned on and the previously set dampening level is displayed. To return to Run without changing the current dampening level press both the Right and Left buttons at the same time. To change the dampening number, use the Left button to scroll the blinking digit to the desired number. After the selection has been made press both the Right and Left buttons at the same time to return to Run.

Indicator Calibration

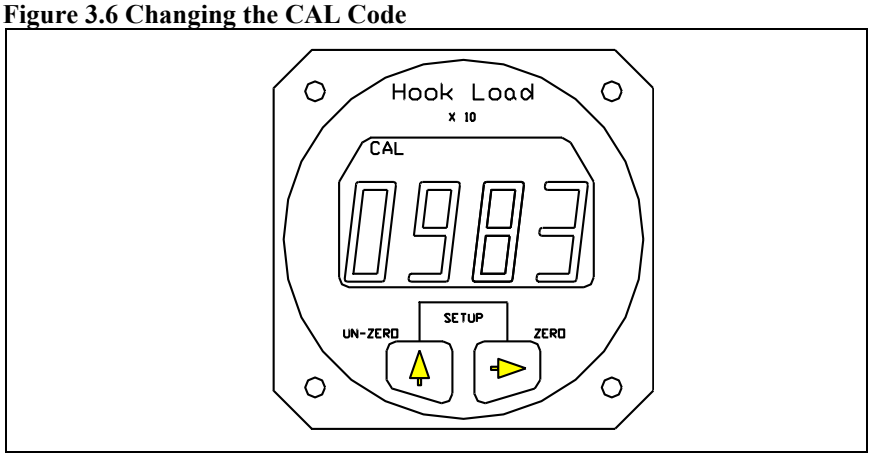
The Calibration Code, or CAL code, is a mandatory input. The Indicator will not accurately display the load without the correct Calibration Code. The Calibration Code scales the signal from the Load Cell.

If the C-39 Indicator was supplied as part of a Load Weigh System, the Calibration Code will have been entered into the Indicator by the factory, however, it should be confirmed. If the Indicator is to be mated to a different Load Cell, it must be calibrated before use. Calibration can be done by entering a known Calibration Code or by lifting a known load and having the Indicator calibrate itself. Both options are discussed below.

To Look at or Change the Calibration Code

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word CODE is displayed, then press the Right button. The display should look like this:

Figure 3.6 Changing the CAL Code



The CAL legend is turned on and the previously entered or computed Calibration Code is displayed. To return to Run without changing the CAL Code, press both the Right and Left buttons at the same time. To change the Calibration Code, use the Right button to select the digit to be changed, then use the Left button to scroll the blinking digit to the desired number. When the Calibration Code has been entered, press both the Right and Left button at the same time to return to Run.

NOTICE

Depending on the type of Load Cell, the Calibration code could be a 3 or 4 digit number. If the Calibration Code is a 3 digit number a leading zero (0) must be used. For example if a Load Cell had a CAL Code of 395 it would be entered as 0395.

If the load cell Calibration Code is not known or as a cross check, the Indicator can generate the Calibration Code. This is done by entering the weight of a known load into the Indicator LOAD routine and then lifting the load. See the section *Calibration by Lifting a Known Load*.

Installation Zero

Installation zero is a routine that matches the Indicator to the ***INSTALLED*** Load Cell. It adjusts the Indicator reading to compensate for the weight of the Cargo Hook on the Load Cell and whatever zero offset is built into the Load Cell. The Installation Zero procedure is not mandatory. If done the Indicator will read zero when the Un-Zero button is pressed and there is no weight on the Cargo Hook. If the Installation Zero is not done, the Indicator will show the weight of the Cargo Hook plus the value of the Load Cell zero offset.

To Run the Installation Zero Routine

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the symbol "0 in" is displayed, then press the Right button. The CAL legend will be turned on and the current weight on the Cargo Hook will be displayed and blinking. Remove any weight that is not to be zeroed out and press either button to complete the procedure and return to the Run Mode.

Calibration by Lifting a Known Weight

Calibration by lifting a known weight is a Setup routine that calculates the Calibration Code for the Load Cell attached to the Indicator. It is useful if the load cell Calibration Code is not known or as a cross check to the accuracy of a known Calibration Code. The procedure is done by entering the known weight into the Indicator and then lifting the weight. This procedure can be done in the shop or on the helicopter. The accuracy of the procedure is directly related to the weight of the known load. If for example the procedure was done with a 1,000 pound load that was assumed to weigh only 900 pounds, all subsequent lifts would be displayed 10% light.

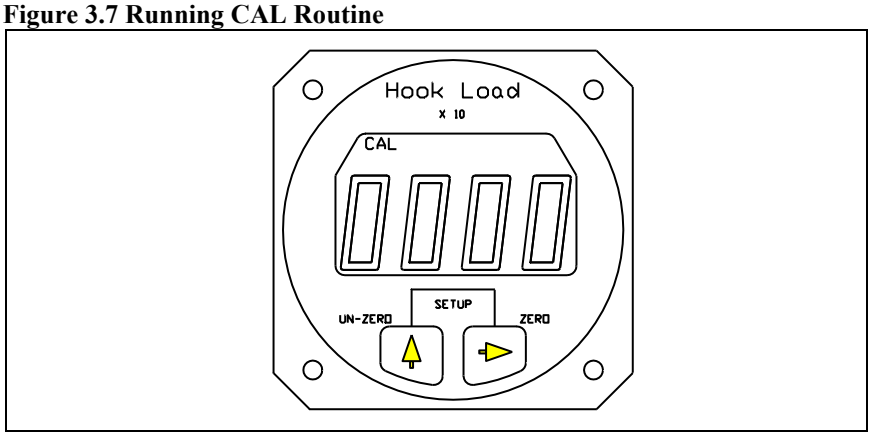
Be sure to include the weight of everything between the Cargo Hook and the load, i.e. the cable, net, dirt, etc.

The closer the known load approaches the lifting capacity of the helicopter, the more accurate the calculated Calibration Code will be.

To Run the Calibration by Lifting a Known Weight Routine

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word LOAD is displayed, then press the Right button. The display should look like this:

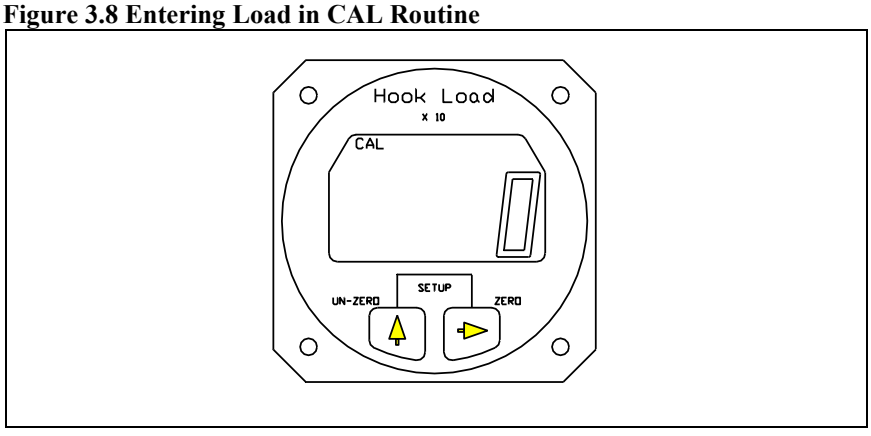
Figure 3.7 Running CAL Routine



The CAL legend is turned on and the first digit is blinking. The previous load is not displayed. At this point if you wish to return to the Run Mode without changing the Calibration Code, power cycle the Indicator. At this point it is not possible to return to the Run Mode without changing the Calibration Code by using the buttons on the Indicator front panel.

To proceed with the procedure, use the Right button to select the digit to be changed, then use the Left button to scroll the blinking digit to the desired number. Note that the known weight is entered "X 10"; a 1000 pound load is entered as 100. When the known load has been entered, press both the Right and Left button at the same time. The display will look like this:

Figure 3.8 Entering Load in CAL Routine



Calibration by Lifting a Known Weight, continued

The CAL legend and the digits will be blinking. Again, at this point if you wish to return to the Run Mode without changing the Calibration Code, power cycle the Indicator. It is not possible to return to the Run Mode by using the buttons on the Indicator front panel without changing the Calibration Code. If you wish to proceed, lift the known load and when it is stabilized, press either button to complete the procedure. The Indicator will display the load. This ends the procedure. The Indicator is now calibrated to the Load Cell. It is a good practice to go to the Code routine and record the new Calibration code for later reference.

Setting the Scale for a remote analog meter

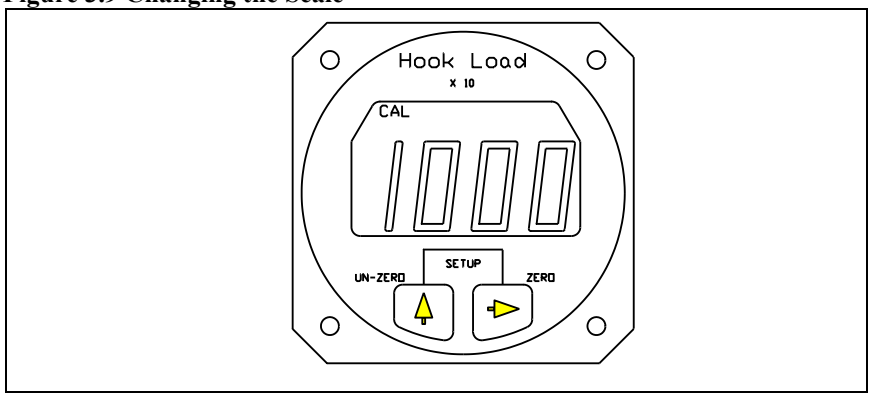
The Scale routine is used when a user supplied analog meter is connected to the Indicator. It is used to match or calibrate the analog meter to the Indicator. The Indicator outputs a 0 to 5 VDC analog signal, which is proportional to the Load Cell load. The Scale number tells the Indicator at what point in pounds or kilograms it should reach the 5 VDC output. If for example a 5 volt analog meter is used and its full scale reading is 10,000 pounds, the number entered into the Indicator Scale routine would be 1000 (the number is entered X 10). This number tells the Indicator that it should output the proportional 0 to 5 VDC signal between zero pounds and 10,000 pounds.

The Scale number does not affect Onboard Slave Meters, P/N 210-106-00 or 210-180-00. This number only affects user supplied instruments connected to the analog out signal.

To Look at or Change the Scale

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word SCALE is displayed, then press the Right button. The display should look like this:

Figure 3.9 Changing the Scale



To Look at or Change the Scale, continued

The CAL legend is turned on and the previously set Scale number is displayed. To return to Run without changing the Scale, press both the Right and Left button at the same time. To change the Scale number, use the Right button to select a digit to be changed, then use the Left button to scroll the blinking digit to the desired number. When the complete Scale number has been entered, press both the Right and Left button at the same time to return to Run.

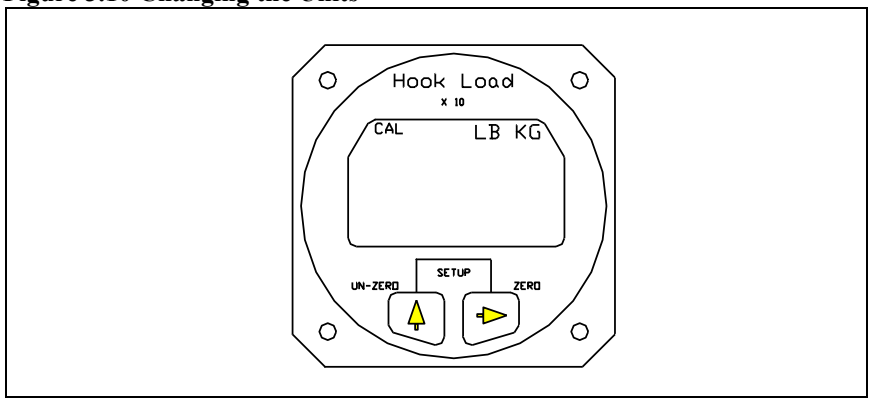
Select KG or LB Units

The units routine sets the display to read in pounds (LB) or kilograms (KG).

To look at or change the Units

With the Indicator powered up and in the Run Mode, press both buttons at the same time to go to Setup. Scroll through the menu until the word LB or KG is displayed, then press the Right button. The display should look like this:

Figure 3.10 Changing the Units



The CAL legend is turned on and the previously set unit is displayed. To return to Run without changing the units, press both the Right and Left button at the same time. To change the units press the Left button. When the selection has been made, press both the Right and Left button at the same time to return to Run.

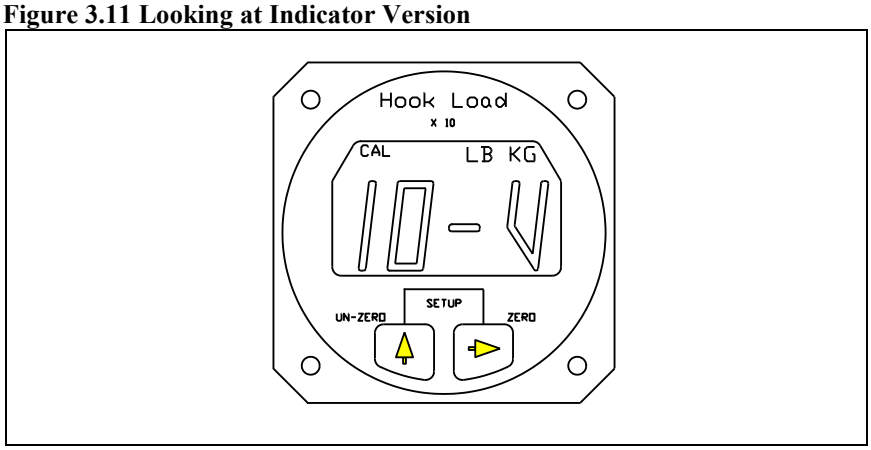
NOTICE

The selected units are displayed when in the Run Mode.

Indicator Version

The Version routine displays the Indicator's hardware and software revision levels. Version is set at the factory and cannot be changed.

Figure 3.11 Looking at Indicator Version



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Section 4
Operation Instructions

Operating Procedures

Prior to a flight involving external load operations, perform the following:

1. Activate the electrical system and press the Cargo Hook release button to ensure the cargo hook electrical release is operating correctly. The Cargo Hook must release. Reset the hook by hand after the release. If the hook does not release or re-latch, do not use the unit until the difficulty is resolved.

CAUTION

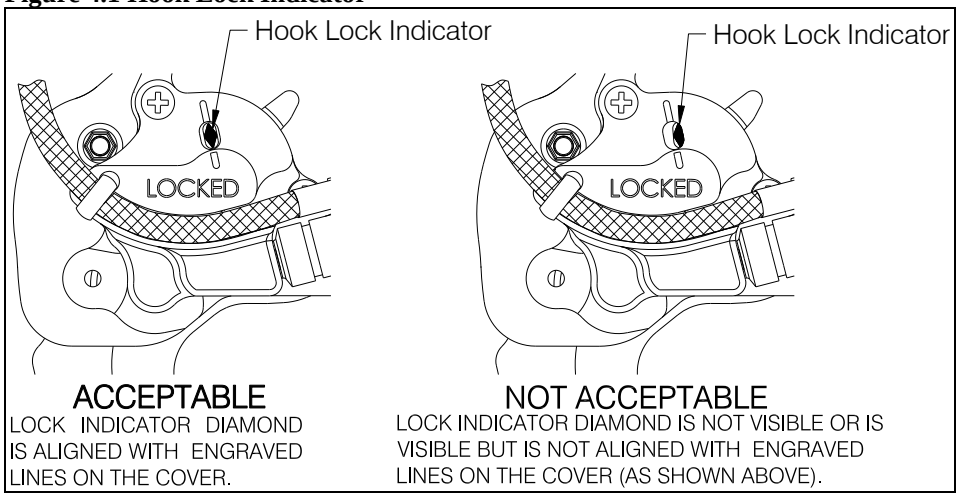
The cargo hook release solenoid is intended to be energized only intermittently. Depressing the electrical release button continuously in excess of 20 seconds will cause the release solenoid to overheat, possibly causing permanent damage.

2. Pull the lever on the cyclic to test the cargo hook manual release system. The system should operate smoothly and the Cargo Hook must release. Reset the cargo hook by hand after release. Verify that the hook lock indicator on the side of the hook returns to the fully locked position. If the hook does not release or re-latch, do not use the unit until the problem is resolved.

⚠ CAUTION

In the fully locked position the hook lock indicator must align with the lines on the manual release cover (see Figure 4.1).

Figure 4.1 Hook Lock Indicator



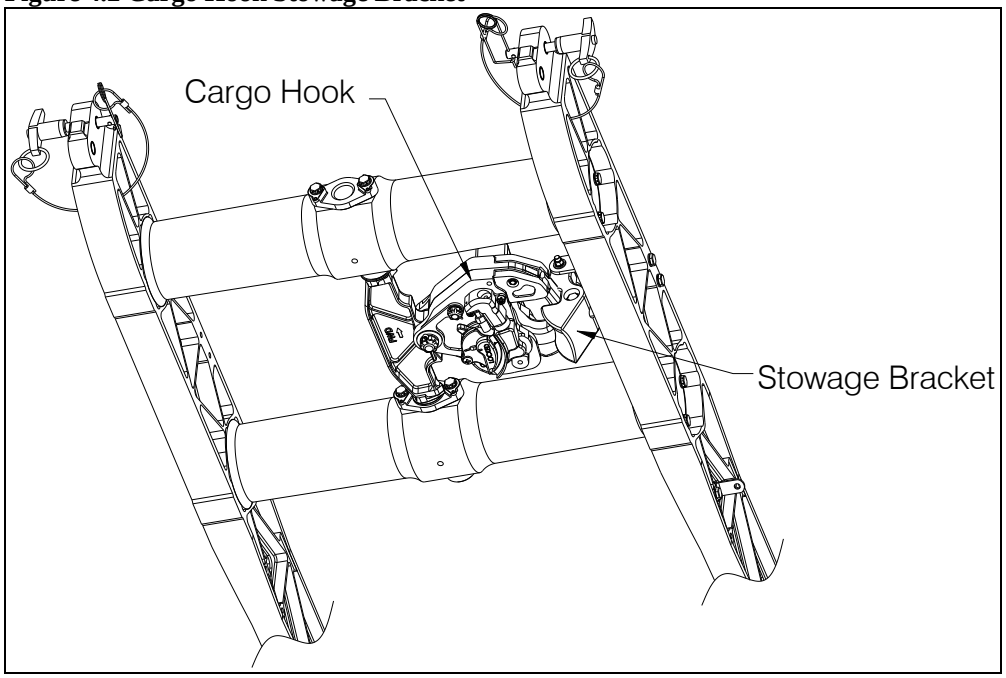
Operating Procedures continued

3. Swing the installed Cargo Hook to ensure that the hydraulic hose and electrical harnesses have enough slack to allow full swing of the cargo hook without straining or damaging the harnesses and/or hydraulic hose. The hydraulic hose and harnesses must not be the stops that prevent the Cargo Hook or the suspension from moving freely in all directions.

Cargo Hook Stowage

The cargo hook suspension frame features a spring loaded stowage bracket which allows the cargo hook to be rotated upwards and stowed at 90 degrees from its operating position when it is not in use. The stowed position increases the ground clearance of the cargo hook, reducing chances of it being accidentally damaged.

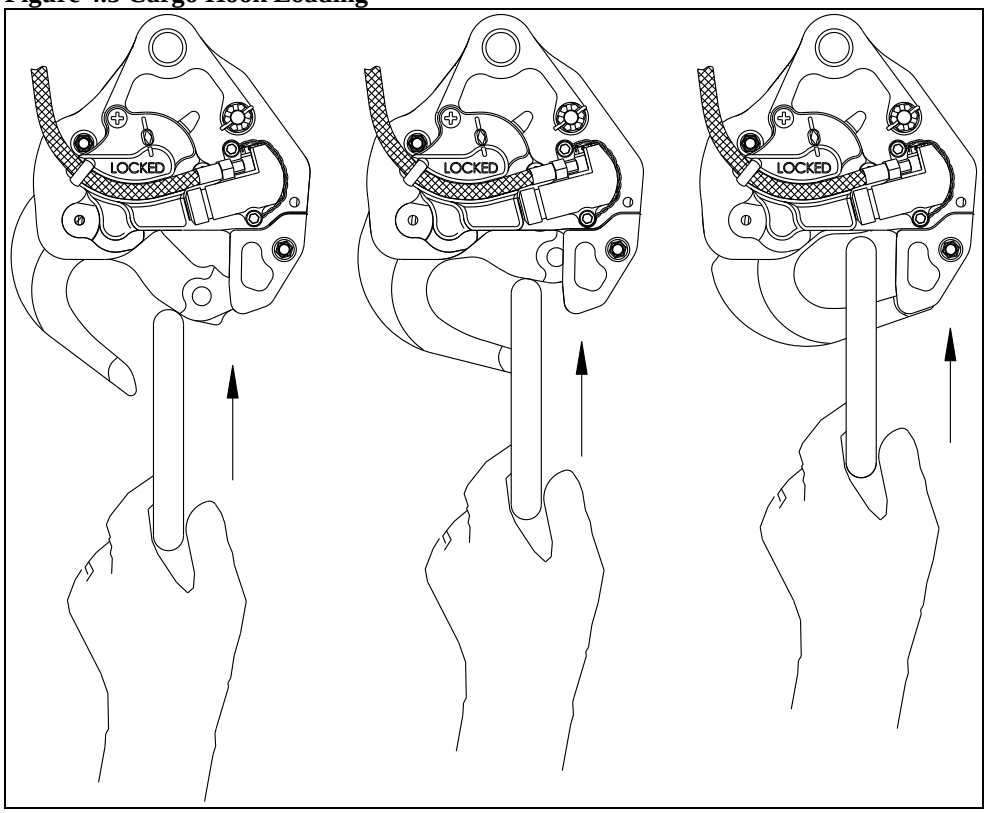
Figure 4.2 Cargo Hook Stowage Bracket



Cargo Hook Loading

The cargo hook can easily be loaded with one hand. A load is attached to the hook by pushing the ring upward against the upper portion of the load beam throat, as illustrated in Figure 4.3, until an internal latch engages the load beam and latches it in the closed position.

Figure 4.3 Cargo Hook Loading



Cargo Hook Rigging

Extreme care must be exercised when rigging a load to the Cargo Hook. Steel load rings are recommended to provide consistent release performance and resistance to fouling. The following illustration shows the recommended rigging and rigging to avoid, but is not intended to represent all rigging possibilities.

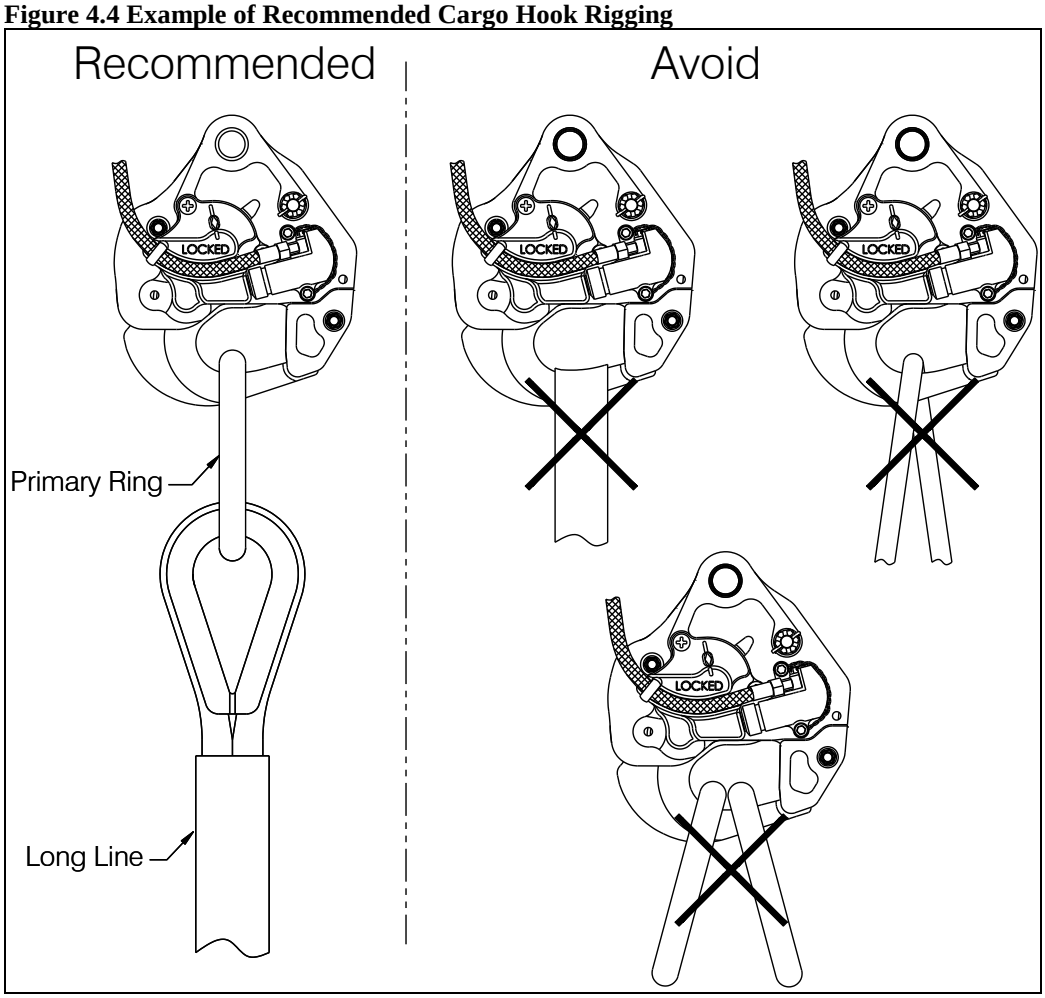
It is the responsibility of the operator to ensure the cargo hook will function properly with each rigging.

Nylon Type Straps and Rope

Nylon type straps (or similar material) or rope must not be used directly on the cargo hook load beam. If nylon straps or rope must be used they should be first attached to a steel primary ring. Verify that the ring will freely slide off the load beam when it is opened. Only the primary ring should be in contact with the cargo hook load beam.

Cargo Hook Rigging, continued

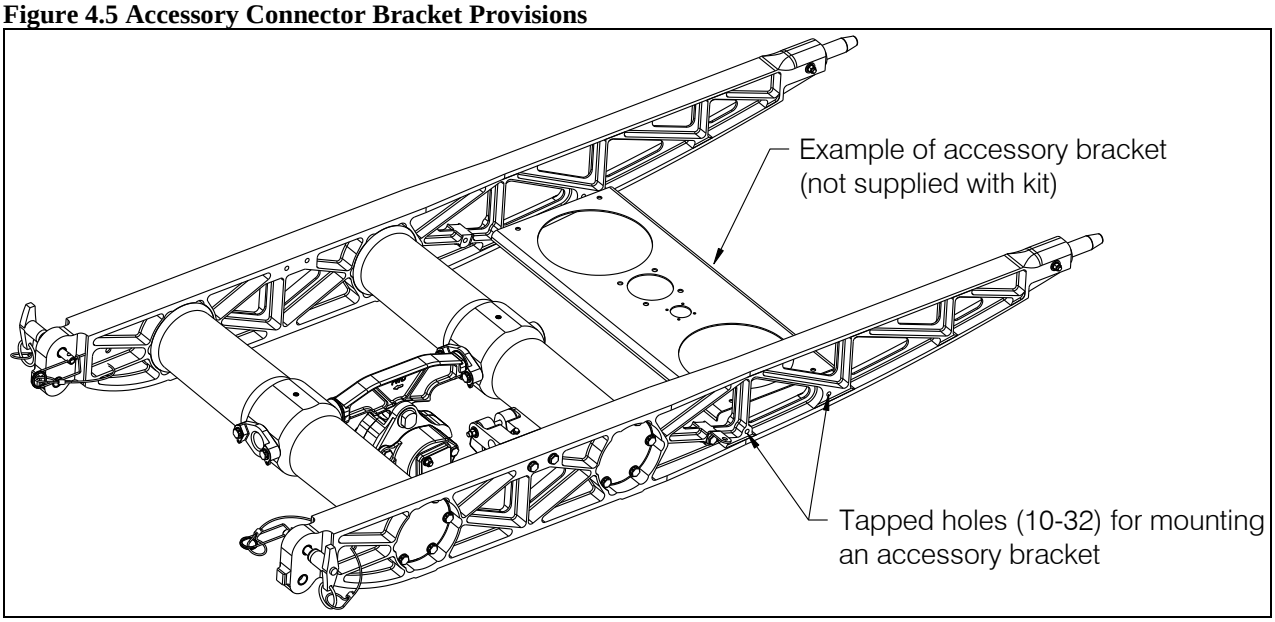
Figure 4.4 Example of Recommended Cargo Hook Rigging



Accessory Connector Bracket Provisions

Each longitudinal beam of the cargo hook suspension frame includes two threaded 10-32 holes that can be used for mounting a bracket (not supplied) for supporting electrical connectors for accessories such as a long line cargo hook.

Figure 4.5 Accessory Connector Bracket Provisions



Section 5
Maintenance

Refer to the Instructions for Continued Airworthiness (ICA) manual 123-036-00 for maintenance of the fixed provisions kit, load weigh kit and cargo hook suspension kits. For maintenance specific to the cargo hook refer to Cargo Hook Service Manual 122-015-00.

Instructions for Returning Equipment to the Factory

If an Onboard Systems product must be returned to the factory for any reason (including returns, service, repairs, overhaul, etc) obtain an RMA number before shipping your return.

An RMA number is required for all equipment returns.

- To obtain an RMA, please use one of the listed methods.
  - Contact Technical Support by phone or e-mail (Techhelp@OnboardSystems.com).
  - Generate an RMA number at our website: http://www.onboardsystems.com/rma.php
- After you have obtained the RMA number, please be sure to:
  - Package the component carefully to ensure safe transit.
  - Write the RMA number on the outside of the box or on the mailing label.
  - Include the RMA number and reason for the return on your purchase or work order.
  - Include your name, address, phone and fax number and email (as applicable).
  - Return the components freight, cartage, insurance and customs prepaid to:

    Onboard Systems
    13915 NW 3rd Court
    Vancouver, Washington 98685
    USA
    Phone: 360-546-3072

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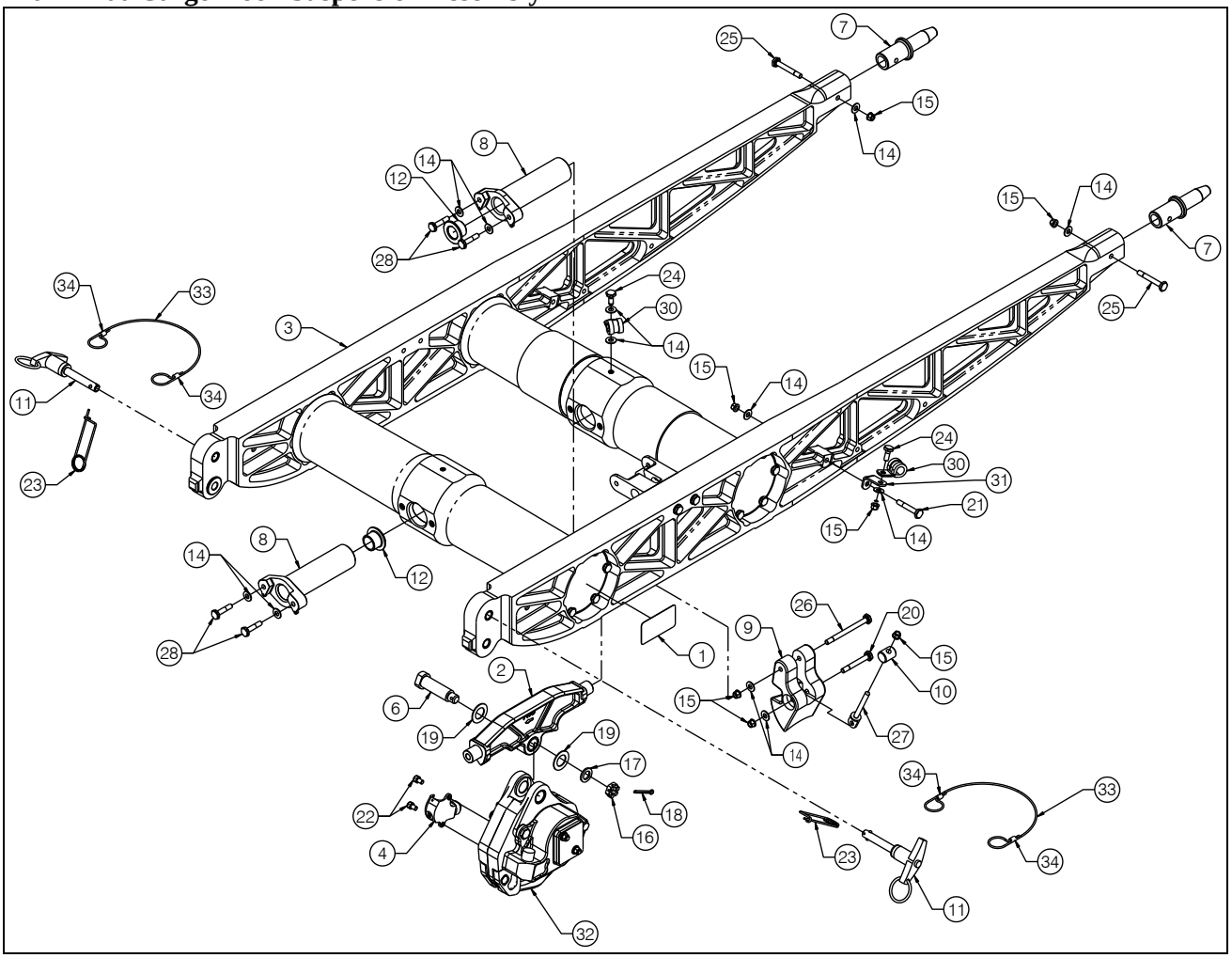
Section 6
System Part Numbers

210-244-00 Cargo Hook Suspension Assembly



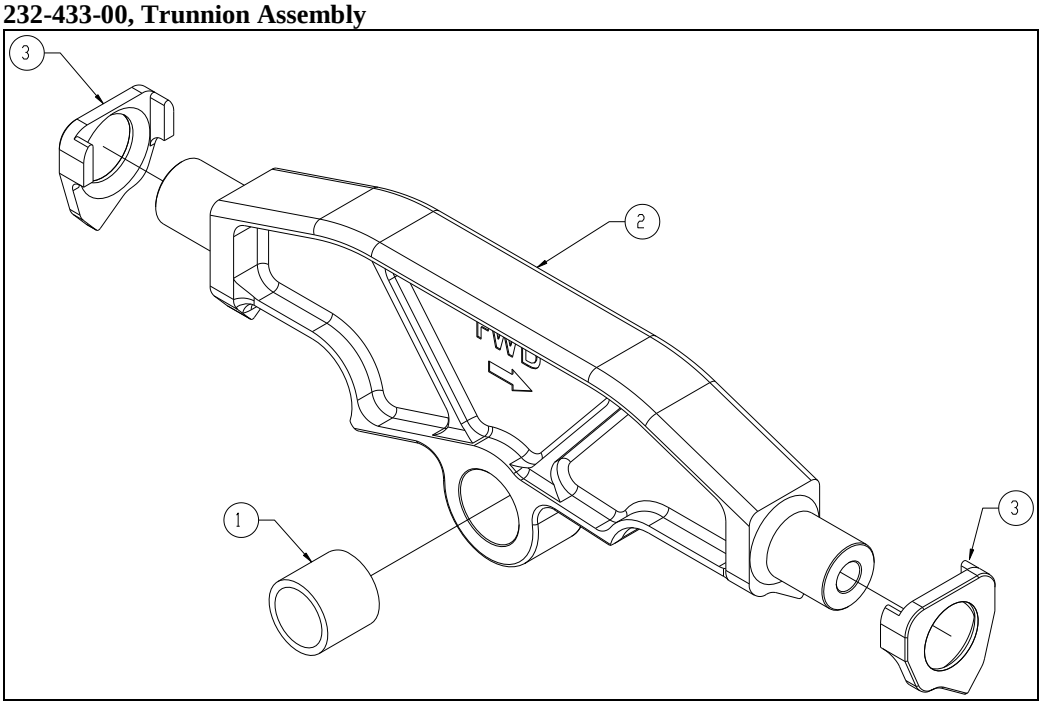
System Part Numbers continued

210-244-00 Cargo Hook Suspension Assembly

ITEM	P/N	DESCRIPTION	QTY
1	215-150-00	Serial Number Decal	1
2	232-433-00	Trunnion Assembly	1
3	232-434-00	A109-A119 Sled Assembly	1
4	232-482-00	Slave Cylinder Assembly w/ Plumbing	1
5	270-181-00	Electrical Release Harness	1
6	290-332-00	Attach Bolt	1
7	291-500-00	Aft Pin	2
8	291-504-00	Center Bar Tube	2
9	291-555-00	Stowage Clip	1
10	291-556-00	Stowage Clip Rod	1
11	291-558-00	Quick Release Pin, Modified	2
12	291-612-00	Modified Bushing	2
13	450-001-00	Heat Shrink	AR
14	510-095-00	Washer	12
15	510-102-00	Nut	7
16	510-170-00	Nut	1
17	510-174-00	Washer	1
18	510-178-00	Cotter Pin	1
19	510-183-00	Washer	2
20	510-452-00	Bolt	1
21	510-455-00	Bolt	1
22	510-531-00	Screw	2
23	510-565-00	Safety Pin	2
24	510-712-00	Bolt	2
25	510-836-00	Bolt	2
26	510-934-00	Bolt	1
27	510-935-00	Eyebolt	1
28	510-949-00	Bolt	4
29	512-011-00	Ty-wrap	1
30	512-027-00	Adel Clamp	2
31	512-028-00	Angle Bracket	1
32	528-028-00	Cargo Hook	1
33	531-010-00	Lanyard Cable	2
34	531-016-00	Crimp Sleeve	4
35	590-013-00	Spiral Wrap	AR

System Part Numbers continued

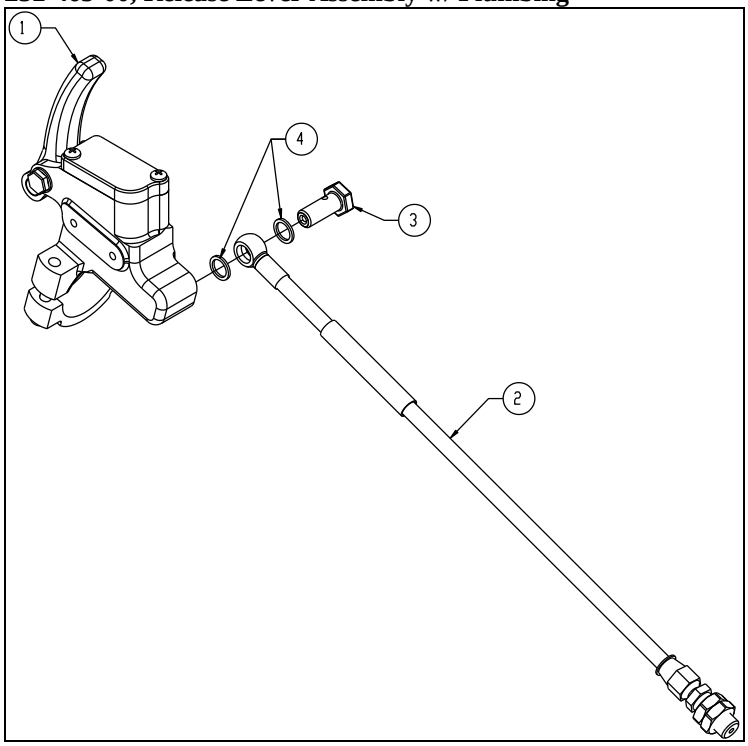
232-433-00, Trunnion Assembly



ITEM	P/N	DESCRIPTION	QTY
1	290-364-00	Bushing	1
2	291-501-00	Trunnion	1
3	291-575-00	Trunnion Pin Radius Filler	2

System Part Numbers continued

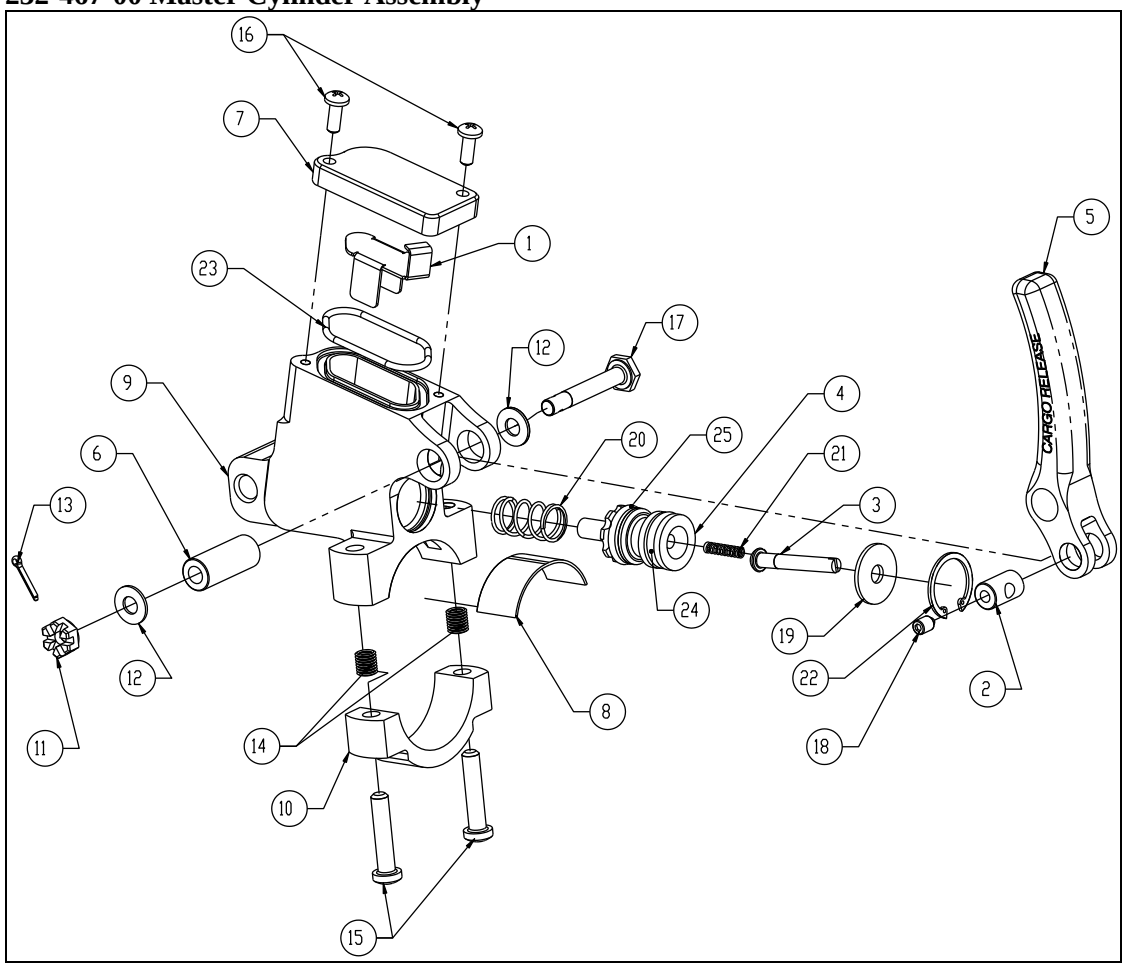
232-465-00, Release Lever Assembly w/ Plumbing



ITEM	P/N	DESCRIPTION	QTY
1	232-467-00	Master Cylinder Assembly	1
2	232-473-00	Hose Extension Assembly	1
3	558-021-00	Banjo Bolt	1
4	556-040-00	Crush Washer	2

System Part Numbers continued

232-467-00 Master Cylinder Assembly



232-467-00 Master Cylinder Assembly

ITEM	P/N	DESCRIPTION	QTY
1	235-124-00	Baffle	1
2	290-812-00	Barrel Nut	1
3	290-813-00	Push Rod	1
4	290-814-01	Piston	1
5	290-906-00	Lever	1
6	290-908-00	Shaft	1
7	290-922-00	Reservoir Lid	1
8	291-143-00	Friction Strip	1
9	291-281-00	Master Cylinder	1
10	291-282-00	Clamp Half	1
11	510-082-00	Nut	1
12	510-095-00	Washer	2
13	510-125-00	Cotter Pin	1
14	510-248-00	Helicoil	2
15	510-390-00	Screw	2
16	510-424-00	Screw	2
17	510-450-00	Bolt	1
18	510-530-00	Set Screw	1
19	510-532-00	Washer	1
20	514-055-00	Spring	1
21	514-060-00	Spring	1
22	515-008-00	Snap Ring	1
23	556-044-00	O-ring	1
24	556-047-00	O-ring	1
25	556-048-00	Cup Seal	1

Section 7
Certification
FAA STC

United States of America
Department of Transportation—Federal Aviation Administration

Supplemental Type Certificate

Number **SR02139SE**

This certificate issued to: **Onboard Systems**
13915 NW 3rd Court
Vancouver, WA 98685

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 27 *of the* Federal Aviation Regulations

Original Product—Type Certificate Number: H7EU
Make: Agusta S.p.A
Model: A109E/A119/AW119 MK II

Description of the Type Design Change: Fabrication of Onboard Systems Model 200-355-00 and 200-369-00 Cargo Hook Fixed Provision Kits, Model 200-356-00 Cargo Hook Suspension Kit, and Model 200-357-00 Load Weigh Kit, in accordance with FAA Approved Onboard Systems Master Drawing List No. 155-160-00, Revision 1, dated April 26, 2011, or later FAA approved revision. Installation of the Onboard Systems Model 200-355-00, 200-356-00, 200-357-00, or 200-369-00 kits in accordance with FAA approved Onboard Systems Owners Manual 120-141-00, Revision 0, dated April 25, 2011, or later FAA approved revision.

This modification must be inspected and maintained in accordance with section ATA 5 of FAA approved Onboard Systems Instructions for Continued Airworthiness Document 123-036-00, Revision 0, dated May 5, 2011, or later FAA approved revision, and Onboard Systems Cargo Hook Service Manual 122-017-00, Revision 13, dated March 29, 2011, or later FAA approved revision.

Limitations and Conditions: Approval of this change in type design applies to only those model rotorcraft listed above. This approval should not be extended to other rotorcraft of these models on which other previously approved modifications are incorporated unless it is determined by the installer that the relationship between this change and any of those other previously approved modifications, including changes in type design, will introduce no adverse effect upon the airworthiness of that rotorcraft. Rotorcraft modified in accordance with this STC must be operated in accordance with a copy of FAA approved Onboard Systems Rotorcraft Flight Manual Supplement (RFMS) No. 121-055-00, Revision 0, dated July 8, 2011, or later FAA approved revision. A copy of this Certificate, the FAA approved RFMS, and maintenance manuals must be maintained as a part of the permanent records of the modified rotorcraft.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: September 17, 2009 *Date reissued:*
Date of issuance: September 13, 2011 *Date amended:*

FEDERAL AVIATION ADMINISTRATION

By direction of the Administrator

(Signature)
Acting Manager, Seattle Aircraft Certification Office
(Title)

Any alteration of this certificate is punishable by a fine of not exceeding $1,000, or imprisonment not exceeding 3 years, or both.

This certificate may be transferred in accordance with FAR 21.47.

FAA Form 8110-2(10-68

Transport Canada Approval

Transport Canada / Transports Canada
Civil Aviation / Aviation Civile

Suite 620
800 Burrard Street
Vancouver, B.C.
V6Z 2J8

Your file / Votre référence

Our file / Notre référence
RDMIS 7446360-v1
NAPA P-12-0040

April 3, 2012

Onboard Systems
13915 NW 3rd Court
Vancouver, WA 98685
USA

Attention: Mr. Mark Hanson

Subject: Acceptance of Foreign STC SR02139SE

Dear Sir:

This is in response to FAA letter dated November 1, 2011, requesting Transport Canada approval of the subject STC.

In accordance with our current policy associated with the review of foreign STCs, some STCs applicable to certain categories of aircraft may be accepted solely on the basis of their foreign certification, and do not require the issue of a corresponding certificate by Transport Canada. The subject STC falls within these criteria.

This STC will be entered in the national index of STCs that have been reviewed and accepted by Transport Canada for installation on Canadian-registered aeronautical products.

This letter confirms formal acceptance of the referenced STC by Transport Canada. Should you require additional information with regards to this matter or clarification please do not hesitate to contact the undersigned at (604) 666-5597.

Yours truly,

Henry W Wong
Senior Engineer, Aircraft Certification

for
Minister of Transport

c.c. Mr. Ross Landes
Acting Manager, FAA Seattle ACO

Canada

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